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LECTURES
ON
COMPARATIVE ANATOMY
AND
ANIMAL PHYSIOLOGY,

DELIVERED BY

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LECTURE XXXIV.

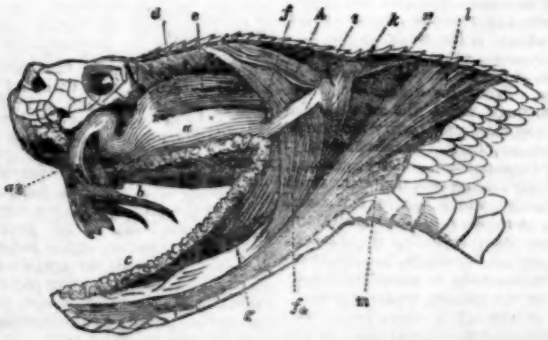
ON THE MUSCULAR SYSTEM OF REPTILES AND BIRDS.

By respiring a purer element, and by possessing organs more extensive and complicated for the aeration of their blood, the air-breathing vertebrata have their muscular system increased in energy and strength beyond what we have seen in the fishes and amphibia, organized for the most part to glide softly by the motions of their vertebral column, through an element of the same specific gravity as themselves. From the thinness of the medium through which the reptiles, the birds, and the mammalia, carry their large trunks, they require this increased muscular strength, and their bones require an increased solidity proportioned to the force of the muscles which are to act upon them. In the lowest of the reptiles, the serpents, we have seen that the trunk of the body only is developed, and the muscles which here serve for progressive motion, are those which act on the moveable elements of the vertebræ, and those which move the vertebræ on each other. By this simple muscular apparatus, and without arms or legs, they are enabled to creep, to climb, to swim, to leap, to seize, and to destroy their prey. We have seen the secure and moveable articulations of their vertebræ, and the great mobility of their ribs, on which their locomotion principally depends. Notwithstanding the projection of the spinous processes from the middle of the back in the skeleton, you observe the cylindrical and smooth form of the entire trunk, from the magnitude of the muscles of the spine which occupy the two sides of these processes along the whole region of the back. The *multifidus spinæ*, with its numerous shining tendons, especially contributes to fill up this groove on each side of the spine, and to bend the column forcibly to either side. We observe, also, in the same lateral spaces, the numerous strong tendons, and the muscular fasciculi, of the *spinales* and the *semispinales dorsi*, which exert a similar action on the vertebral column. Short as we observe the distance from one broad spinous process to another, and between the short transverse processes which support the ribs, those parts are moved separately by strong *interspinales* and *intertransversales* muscles. The creeping motions of serpents, however, are chiefly effected by the ribs; and the intercostal muscles disposed on the exterior and the interior of the ribs, are those which are the most vigorous of the muscles of the trunk in serpents. It is in consequence of the great development and the use of those muscles to the serpents, that they cannot possess a sternum to fix their ribs on the anterior part of their body, but must have the whole of the anterior cartilaginous parts of their ribs free from all impediment to their extensive motions. These muscles partly represent the ordinary oblique and transverse muscles of the abdomen in higher animals, and are here divided by the ribs on the sides of the trunk, as you observe the *recti* muscles of the abdomen divided in front by the cartilaginous extremities of the ribs, like the tendinous intersections of the *recti abdominis* in man. We find them, some passing directly from rib to rib, others passing over one or more of these bones which are

the legs of the serpents to take a more distant insertion. They are especially powerful on the anterior portion of the trunk, where they assist also in respiration by compressing the respiratory sacs. Their various single and combined actions move the ribs in every direction which the articulations will admit of. The effect which their motions have on the exterior of the body, is to move not only the whole skin and the scales covering the skin, but to affect more especially the large inferior scuta, those broad, transverse, horny, imbricated bands that cover the abdominal surface of the trunk. Thus, by erecting these anterior scuta, by fibres extending from the cartilages of the ribs, and obtaining thus a firm purchase against the rough or solid surface on which the body rests, we observe that the posterior part of the trunk can be drawn upwards or forwards towards the fixed point, towards the anterior part of the body, and this can be performed with several parts of the trunk at the same time. By raising these scuta by means of the muscular fibres on the anterior part of the ribs, they can often obtain a purchase from the smallest objects, and pass, for instance, over a cord, or a wire, placed at a considerable height from the ground, creep over the surface, and descend on the opposite side, although we might imagine that the smooth cylindrical body of serpents possessed but imperfect means of holding by so fine an object as a wire. By the same means they climb on trees, twining their body round the stem or branches. We can easily feel the motions of these large scuta, or broad abdominal scales, by allowing the animals to creep over the surface of the hand, and we can see distinctly their ribs in active motion while they creep along. These intercostal muscles of the serpents pass forwards along the sides of the trunk as far as the cranium, for there are here no true cervical vertebræ destitute of ribs. The ribs extend to the atlas, and the whole of the vertebræ therefore are in a condition of dorsal, from the head down to the anus. We observe, that on the anterior part of the trunk, next to the head, those muscles act generally with more vigour upon the ribs, and often cause them to extend laterally, to dilate the neck, and to assist in maintaining that inflated condition of those parts, which we see assumed by the spectacle-snake in India, when irritated and preparing to bite. The interrupted *recti* muscles of the abdomen are important organs in the serpents, from their action on the free extremities of the ribs, from their bending the trunk forwards, and compressing the abdominal cavity and its contained viscera. The cloaca has also its distinct muscles for opening and closing that cavity, and the rudimentary feet and pelvic arch we sometimes find developed from its sides. We observe also the scapular arch, which is developed in the most perfect of the ophidian reptiles, to be already provided with muscles, though not yet destined to support anterior extremities.

From the divided condition of the bones of the head, and the extent of motion they admit of in serpents, we observe the ordinary muscles to consist of more lengthened fasciculi, and even subdivided into distinct bands. We see especially the divided condition of the temporal and the pterygoid muscles, so important in the motions of the lower jaw. In the poisonous serpents, as in the rattle-snake (*Fig.* 142), there is a distinct transverse

Fig. 142



portion of the *buccinator* muscle passing over the large poison gland, and serving to force the poison into the duct and the fang when the wound is inflicted; the

masseter muscles are also powerful in these animals, and all the muscles serving for the elevation and the depression of the lower jaw, to seize or to embrace their large undivided prey, which they must swallow entire.

The possession of anterior and posterior extremities, for progressive motion, by the *saurian* reptiles, adds greatly to their muscular development, and to the extent and variety of their locomotive powers, whether exercised on the land, or in the water, or in the atmosphere. The saurian reptiles employ their extremities in very different ways in these various situations, and thus require a considerable diversity in the outward forms, and the muscular disposition of those members. We observe that this difference of employment in the extremities is also accompanied with important differences in their general structure. Thus we see in many of the lizard tribes organized to climb on the branches of trees, that the hands and feet are long, flexible, and slender, and the tail also lengthened and slender, as in the *monitors*, and long, like a whip, as in the *iguana*, and in many of those reptiles which we find to climb for their food, whether of an animal or vegetable nature, upon trees. Others again, as the alligators, the gavials, and the crocodiles, have the tail strong, muscular, and compressed, the feet webbed, and all the disposition of parts adapted for a semi-aquatic life. We see in these aquatic sauria, as we saw in those amphibious animals which permanently retain the gills, and in those which lose the gills in the larva state, that the coccygeal region of the trunk is the principal organ of progressive motion, and is provided with lateral muscles of great size and force disposed in parallel strata. We see that in these existing aquatic saurians, and the same structure has existed in those numerous extinct saurian aquatic animals whose remains abound in our ancient secondary lias formation.

Now, for the motions of swimming, we observe in these crocodilida that the action of the compressed perpendicular tail must be from one side to the other, and not from above downwards, or from below upwards, a motion of the tail resembling that of fishes, and not that of cetacea. We see that the tail of these crocodilian animals presents a character intermediate between that of the fishes, which is directed perpendicularly, and is wholly organized for a motion forwards in a horizontal plane, and that of the cetacea, where the development of the tail is transversely, and the best adapted for motion upwards and downwards. For you will observe that the lower part of the coccygeal region in those crocodilida is broad and rounded, and it presents both transverse and spinous processes for the attachment of the powerful muscles of the tail, so that it is capable of exerting great force in every direction, though most powerfully from side to side. But it is obvious from the hard scales presenting this carinated appearance, like a perpendicular dorsal fin along the body, along the tail of these crocodilida, and from the compressed form of the coccygeal region, that their motions in the water are effected by the serpentine movements of this vertical organ. This implies motion upon a horizontal plane, and the vertical motions are aided by the webbed feet. The flexibility of the tail, however, and its great muscular force and thickness, and the muscular strength and webs of the arms and legs in these animals, furnish them with the means of swimming horizontally through the water, of rising upwards and downwards, of walking on the surface of the soft mud, or running on the solid banks. The pectoral muscles, and the whole muscles of the thorax and of their thick strong neck, we find to be powerfully developed in these aquatic reptiles. The muscles of the abdomen are also powerful in the crocodiles, and they employ them in the compression of that cavity of the trunk, to diminish the specific gravity of the whole trunk without expelling the air from their extremely subdivided cellular lungs, so as to enable them to rise and to sink in the water without much expenditure of muscular force, as does a fish by compressing its air-bag. We have already seen, that in order to facilitate the action of these muscles, particularly the recti muscles of the abdomen, the tendinous intersections of those muscles are here ossified, and that the ossified tendinous intersections of the recti constitute the abdominal ribs so remarkable in these aquatic species. The muscles on the back of the neck, connecting the head with the trunk, are large, and the neck is short, thick, and powerful, in these aquatic sauria, to hold their struggling victim under water, and to swallow it entire. This is the more required, also, on account of their carrying their prey, often of great bulk, for some distance to the water. We see them seizing upon the banks of the great rivers in Africa, in America, and in India, where they chiefly abound, the cattle which are grazing on the neighbouring pastures, and conveying them under water, there to commence their violent muscular exertions to suffocate their prey. It is said, however, that they do not attempt to tear the prey piecemeal immediately after its

motions have ceased, but that they allow it to remain for a time to soften, so that it may be the more easily divided or swallowed. The webs which we observe between the toes on all the feet of these aquatic saurians, indicate the uses to which they are applied, both in walking over the soft muddy banks of the great rivers they frequent, and for swimming in the water.

We observe, here, animals with a head largely developed, and the face of great extent, much depressed, and extended laterally; yet notwithstanding this extent of the osseous surface, it is remarkable to notice how slightly the muscular system is developed in the region of the face. The greater portion of the upper part of the face, indeed the whole surface of the head, has but little muscular development, and the cranial cavity, we have seen, only occupies a small tubular passage at the lower part and centre of this great lengthened and depressed head. We observe that the epidermis, as in the trunk of the chelonia, is applied almost directly to the surface of these bones, and corresponding precisely, in this rough tuberculated covering, with the rough surface of the bones themselves. Here, therefore, numerous muscles are wanting, which generally occupy this region of the face in the higher animals, and even in the fishes and amphibia. One object, no doubt, of having this roughness, and this dark-coloured brown decayed exterior appearance over the surface of the bones of the head, and the roughness over the whole back, is for concealment. We observe that nature has ever been provident in giving carnivorous animals not only the means of perceiving, but of waylaying and securing their necessary prey, and of overcoming it by various means when it is necessary to encounter resistance. These animals imitate, by this exterior rough tuberculated surface, and particularly those longitudinal carinated markings which cover all the exterior surface of their bodies, the decayed trunks of the trees among which they lurk and conceal themselves,—trees which have been washed down by the inundations of great rivers, and are strewed over their banks.

But we perceive that these animals want numerous superficial muscles, which occupy this place in the mammalia and other vertebrated classes. The temporal muscles are powerful in these reptiles; and these are concealed by the expansion of the posterior frontal, the temporal, and the malar bones. They pass up, thus secured against injury, from without, and occupy those lateral cavities which we observe above and posterior to the orbits. They are placed within, not without, the ordinary bones. The masseter muscles are also of considerable strength, and the strength of the muscles of the lower jaw corresponds with the fixed condition of the teeth, and of all the bones of the head.

The muscles of the short and fleshy tongue and of the os hyoides, are likewise powerful in these aquatic reptiles, but the muscles are chiefly powerful which we observe on the back part of the short thick neck connecting the head to the vertebræ and to the trunk, and we have seen the broad, arched, transverse processes developed like ribs from the sides of the neck, impeding the lateral motion in that part of the column. They approach to the mammalia in the strength and muscularity of their legs, but these are so short and distant that the long trunk almost touches and easily rests upon the ground when not suspended in the water.

More nimble movements and more light and pliant forms of the locomotive organs and of the whole body are seen in many of the terrestrial, climbing, long-toed and long-tailed lacertine sauria. The[illegible] is generally thick, short, an[illegible] and enables them to carr[illegible] or to swallow it entire, a[illegible] tail generally tapers [illegible] trunk, though often [illegible] extent, narrow and [illegible] of prehension, to a[illegible] or fixing on the t[illegible] trees. The obliqu[illegible] merus and femur [illegible] wards, weakens th[illegible] and adapts them l[illegible] for running—bette[illegible] for support, and th[illegible] raised above the grou[illegible] running up the perpen[illegible] trees, or the smooth surfa[illegible] or rocks or cliffs, with great [illegible] and security, aided by their long [illegible] fingers and toes, their sharp curved long claws, their slender lengthened tail, and the scales on their surface. The muscles of the coccygeal vertebræ are short and interrupted, and radiate chiefly from the bones to the skin, so that these vertebræ are easily detached, the tail, generally cylindrical in its form, is easily broken, and is renewed when lost, as we see the entire arms of the tritons renewed when they have been cut off. As their ribs are moveable, and provided with powerful intercostal muscles, their motions assist in inspiration, and by their forcibly compressing the trunk they produce the long-continued hissing, when irritated, so common to all these cold-blooded air-breathing classes of vertebrata, which are capable of producing no other vocal sounds. The

amphibia which often want ribs, and the chelonia which have the ribs immoveable, breathe air chiefly by the motions of the os hyoides, and we have seen that the currents in all water-breathing animals, up to the amphibia, are effected by the rapid vibrations of minute cilia disposed chiefly on the surface of the breathing organs themselves.

Besides the ordinary long climbing hands and feet, and a long whip-like prehensile tail, the *flying dragons* (*Fig.* 143) have all

Fig. 143

their posterior ribs extended out straight from the sides of the column, moved by powerful intercostal muscles, connected by a fold on the skin, and forming a parachute by which they are enabled to dart through the air after their insect food. The *geckos* of India, with a short trunk, a thick short tail, short muscular legs, and expanded fingers and toes terminated by curved tense and very sharp claws, are seen to up the smooth perpendicular walls long the ceiling of the houses, and aided in these muscular feats by transverse folds of the skin co- under surface of the expanded he toes and fingers, and which e like suckers to the smooth which they creep. The mus- e vegetable-eating sauria are d vascular, less tough and irri- in the carnivorous kinds, as ve indeed in all other classes e muscular substance of the ve- e eaters is tender and palatable for while the flesh of the carnivorous ecies is tough and rancid. The iguanas and the scincks are among the few sauria whose flesh is thus tender and used as food. The muscles of the reptiles are more vascular and deeper coloured than those of fishes or amphibia, and have greater contractile power, but from their still slow movements they possess in a less degree those properties than the highly energetic muscles of warm-blooded rapacious birds or quadrupeds.

The cameleons are remarkable for the want of simultaneous action in the muscles of the two eyes, as we see the flounders remarkable for the want of symmetry in their position: this is an irregularity in muscular action which we scarcely observe in the eyes of any other vertebrated animals. Their whole motions are slow and cautious. Their organs of prehension, their hands, their feet, and their tail, move with great slowness, and grasp with considerable firmness. We observe that they possess a body which is obviously, from its thick and massive form, but ill adapted for velocity of motion. They have a neck so short as scarcely to be perceived between the head and the trunk. The motions of the head from side to side are scarcely perceived in the living animal, so slightly does it possess the power of moving its head from side to side. It possesses this power even less than the crocodilida, which have the transverse processes of the cervical vertebræ so large, and detached from their bodies, that they look like ribs, and where the neck also is little susceptible of motion. This slowness and stiffness are a wise provision for the cameleon. The food of the cameleon consists of the flies which they see upon the branches of trees. For seizing those flies they are not provided with wings, like the dragon, formed by the extended ribs, but with a tongue having the body of the os hyoides, extended like a probe through its interior—a cylindrical bone, you perceive, of nearly an inch and a half in length, which I have here drawn out from the tongue which covered it like a sheath. This long muscular tongue is the instrument by which alone they are to seize their prey. The slightest disturbance by a motion of so large a part of their body as their head, in order to seize the flies that are running about on the leaves, would be sufficient to alarm them, and to cause them to remove. It is thus, therefore, that we observe those animals provided with every means of concealment, by their cautious motions, and their changes of colour. They have the power of changing the colour of their surface to almost any hue; red, white, black, green, yellow, brown, and I have even seen all those hues beautifully mingled, so as to produce a mottled appearance over the whole

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surface, then passing from one hue to the other, without any apparent order or object in assuming the several hues. So that these animals may possibly assume a green colour when they are upon green branches or leaves, brown when they are upon a brown surface of decayed bark, or any colour that may be the most convenient for concealment. The changes of colour appear to me almost to be regulated by the volition of the animals. I have observed when the animal before you escaped from the myrtle growing in a flower-pot in which I kept it alive, and concealed itself in a dark part of the room, that I generally found it in that situation of a black colour, like ink, and that soon it would assume another colour. It did not always assume the colour of the place where it was resting; because sometimes upon the green cloth covering the table it would assume a yellow appearance, or a white, or a red, or a mottled hue.

The want of mobility in the neck, which is so beautifully adapted to prevent it disturbing its prey, we see compensated by the motions of other muscular parts. The eyes are covered over by the common spotted skin, except a small slit opposite to the pupils; the whole of the rest of the moveable balls of the eyes we perceive to be completely covered by this spotted skin. The ball of the eye on the one side never moves in the same direction that ever I could observe, by any chance, as that in which the ball of the other eye moves; for when the animal has one eye directed backwards, the other is seen to be directed right forwards, or upwards, or downwards; or when the one is directed perpendicularly upwards, the other may be directed downwards. The one may be fixed on some object which arrests the animal's attention, and the other employed in taking a survey in all directions of the surrounding objects. But while the eyeballs move, the coloured integuments surrounding them also move with them, so that they are still covered with the green, or brown, or yellow, or other colour the animal has assumed, and there is thus the least possible chance of the insect's perceiving the motions of the eyeballs. Thus, then, there is every means of their perceiving their prey and of not disturbing it. The tongue is moved forwards with considerable velocity. It terminates in a dilated clavate portion, which presents a beautiful villous appearance. This villous terminal surface serves to entangle the feet of the insects that happen to alight upon it when it has been extended for that purpose. It is copiously lubricated at its dilated extremity by an adhesive mucous secretion, which tends likewise to assist in seizing the prey. The villous appearance, however, independently of the secretion, would be sufficient to entangle and seize the feet of the insects that may alight upon it; for this dilated portion terminates in a small moveable projecting part, like that on the end of the elephant's proboscis, which by the slightest motion upwards, can bring all those villi into contact, and thus hold the animals that alight upon the surface.

We observe that the anterior and posterior extremities are peculiarly formed in the cameleons, in having three thumbs opposable to two fingers on the hands, and two toes, like thumbs, opposable to three on the hind feet. With this the grasp is taken with greater security. The muscles here are powerful, as you may perceive, both in the extremities and in the thick prehensile tail. The flexors and extensors are very powerfully developed, particularly the flexors, and thus the fingers and toes continue thick and muscular, to the claws. The object of this is, that the cameleon, when it is upon the remote outer slender branches of trees, such parts of the branches as are most likely to contain the greatest abundance of prey, may be able to withstand the motions which these extreme branches of the trees are exposed to by agitation of the winds. The flies and other insects on which the cameleon feeds, are generally buzzing about the flowers, or sucking the exudations from the leaves, the respiratory organs of the plants, and consequently at the extreme outer parts of the trees. It is not upon the trunk or the principal branches of trees, where there is the least motion, that the cameleon is to obtain its food; but it must go to the extreme points, there to catch the flies and feed. Thus it has the means of grasping with great security,—like the sloths among the mammalia, slow, but secure in all its motions. The tail is here a powerful muscular organ of prehension; we observe it twining with force around the branches of trees, and grasping by that organ as well as by the strong muscular hands and feet.

The muscular apparatus for progressive motion of the *ichthyosaurus* (*Fig. F F*),* the *plesiosaurus*, and other extinct aquatic sauria, must have been chiefly placed on the sides of the vertebræ, for the lateral motions of the column, as we find no vertebræ anchylosed to form a sacrum or fixed part for the attachment of legs adapted to overcome much resistance, their transverse processes were short, as in cro-

* Page 701, last vol.

codiles, and their arms and legs formed undivided fins like the arms of cetacea, moved chiefly by the muscles inserted into the humerus and the femur, the whole extremity below this moving as one piece. The great pectoral muscles of the *pterodactylus* (*Fig. G G*)* must have extended over a large part of the trunk, and have acted with great force on the humerus, as in the bats, to bring down the expanded wing with impetus against the air, and carry up the trunk through that medium —a structure not now found in the arms of any reptiles, though it is seen in fishes, birds, and mammalia.

Thus the development of the sternum, limiting the mobility of the ribs and the development of the extremities for various kinds of locomotion in the saurian reptiles, have given rise to considerable differences in their muscular apparatus, as compared with that of the armless and legless serpents, and all their specific peculiarities of muscular development are intimately connected with the various wants and conditions in their living state.

In the massive short round trunks of the *chelonian* reptiles, we have seen several important parts of the skeleton, as the ribs, the vertebræ of the trunk, the sternal ribs, the elements of the sternum, to remain for the most part immoveable upon each other; and the whole trunk, particularly in the land species, is thus surrounded by an immoveable case, composed of the sternum, of the sterno-costal appendices, and of the ribs, so that there are many muscles of the trunk which we perceive here to be totally useless and entirely wanting. All that series of the intercostal muscles, and divided abdominal muscles, which formed almost the entire muscular apparatus for the progressive motion of the serpents, is here wanting. Their respiration is effected, therefore, by a muscular apparatus, very different from that of the orders of reptiles where the ribs are moveable.

We observe a continually repeated action under the lower jaw in these chelonia, a constant and repeated action of the os hyoides, as in the ribless frogs. They draw in air, by thus retracting the os hyoides, through the nostrils to the back part of the mouth. The posterior nares are then closed, and by another action of the tongue and pharynx, resembling that of deglutition, the air is forced down the trachea; thus inspiration is effected by a kind of pumping motion, without any aid from the ribs. The enormous cellular cavities of the lungs on each side of the body, extending to the back part of the pelvis, and all over the back of the animal, are thus gradually filled. The act of expiration is effected by the muscles which affect the general cavity of the abdomen; for although we perceive the muscles of the trunk to be here almost wanting externally and internally, excepting those which pass down for the motions of the humerus and the femur, and the muscles on the back part of the trunk for the motions of the head and neck, are still particularly strong and well developed. The abdominal muscles we observe extending from the inner part of these sternal pieces to the back part of the ribs. By these muscles the viscera of the abdomen are compressed; the lungs are thus compressed, and expiration is effected, and the expulsion of the feces, and the expulsion of the eggs, are also assisted, although the trunk is closed in an immoveable box.

The parts of the vertebral column which in these animals are susceptible of motion, are the cervical and the coccygeal vertebræ, and, to a slight extent, the sacrum, with the pelvic bones. You observe, therefore, that the muscles connected with those parts are here distinctly developed and well marked; but in consequence of the immobility of the other parts of the vertebral column, we observe many muscles, important and large in other animals, to be here deficient. Both the *recti* and the oblique muscles of the abdomen are seen on the parietes of that cavity, and, behind, a muscle analogous to an imperfect diaphragm. The *omo-hyoideus*, the *trapezius*, and the *rhomboidei*, are here distinct and important muscles. The muscles of the scapular and pelvic bones, though placed within the general osseous covering, have their usual connexions and uses, which point out their analogies with the corresponding muscles in other classes. The muscles of the leg and of the fore-arm are very powerful in the land-tortoises, and correspond with the great weight those thick short extremities have to support; but in the aquatic chelonia, in the large turtles, the muscles of the humerus are of great force, and we have already seen that bone to be much larger than the femur, and that the whole anterior extremities in these aquatic species are much larger than the posterior. These are important organs, employed by the aquatic species in the act of swimming. The neck is moved in every direction by very powerful muscles in the land-tortoises, and in the turtles (*Fig.* 144) of the sea. The *recti* and *obliqui capitis*, the *intertransversales*, and the *spinales*, are well marked and constant, but the *longi colli* are those most exerted in withdrawing the head, and folding the neck backwards, in a sigmoid

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Fig. 144

curvature, within the large arched carapax of the land species.

The food of these chelonian reptiles, both of those which inhabit the land, and those, like the turtle, which inhabit the waters, consists most generally of vegetable matter, which they have no teeth to masticate, but which they cut into pieces by the sharp horny covering which we have seen upon the upper and lower bills, covering the upper and lower jaws, somewhat resembling, in the upper mandible, the beak of a bird. In order to cut through the thick stems of marine plants, upon which the turtles feed, a considerable force is required, and where the instruments are by no means of that density which we find in saurian reptiles, or in ophidian reptiles, or in mammalia, but only of a horny texture, and where the lower mandible has not that sharp cutting edge which we see in the upper mandible, this obviously requires that the temporal and the masseter muscles should possess greater thickness and strength; and accordingly we find that here, from their being attached so far forward on the short strong muzzle, they act with great force upon the lower jaw in bringing it upwards. From the extension forwards also of the malar bones, we observe that the masseter muscles act most favourably on the lower jaw, and bring it with great power against the upper jaw, so as by that action to divide the tough coarse food. The temporal muscles are exposed on the sides of the head in the land tortoises, as in the mammalia, but they are covered over with a bony arch in the turtles of the sea, which cannot retract their head, by their long muscles of the neck within the carapax, like the land species. Thus we perceive that besides the want of many important muscles in the *chelonian* reptiles, in consequence of the immobility of several parts of the skeleton, moveable in other vertebrated classes, the muscular system of these animals is peculiarly characterized by the transposition of the muscles of the scapular and pelvic arches, from the exterior to the interior surface of the bones from which they take their origins.

In the muscles of *birds* we observe the vital properties of these organs to have arrived at their maximum of development, which is requisite to adapt these animals for their aerial life, and to carry their trunk through so rare a medium as the atmosphere. Their irritability or power of contraction is the greatest in the living state, and is the most quickly lost after death, its tenacity after death being generally in the inverse ratio of the degree of activity of that power during life. The muscles of birds are more firm and vascular, tougher, stronger, and of a darker colour, than in the cold-blooded vertebrata, and they possess most of these properties in the rapacious kinds, where they are most exerted and have most blood sent through them. In the heavier vegetable-eating birds, where the muscles are feeble and less exerted, they are pale, and have less blood sent through them in a given time, and are, consequently, more tender and palatable as food. This elevated condition of the muscular system is accompanied by a high development of the nervous and vascular systems, by an extensive and quick respiration (which aerates the systemic as well as the pulmonic blood), by a high temperature of the body, and by increased energy of all the functions. We observe the same high power of muscular contraction accompanying a very extensive respiratory system in insects. This muscular force is necessary in birds, to fly for safety or to pursue their prey through the air, to follow the seasons from latitude to latitude, and to perform their migrations over mountain-chains or continents or the trackless ocean. Their muscular efforts are partly relieved by the substitution of air for marrow in the bones, and they are delicately sensible to changes in the condition of the atmosphere, and become augurs of the weather. In birds, indeed, we find the respiratory organs the most remarkable among the vertebrata for their extensive development, not being confined to the undivided lobes of their lungs, or the cells of the lungs, which are largely developed in the lower part, as in reptiles, and extend throughout the cavity of the abdomen; but these cells even extend into the neck, into the axilla, into all the bones themselves, as far as the hands and feet, making them like air tubes. So that the systemic blood here comes in contact with atmospheric air in almost all parts of the body—the branches both of the systemic and pulmonic arteries are aerated, and a high temperature is obtained for incubating on the eggs, and aiding the high development of the young.

The muscles of birds, especially of the extremities, are generally short and

thick, and their tendons are long, slender, dense, and often ossified; so that the fleshy parts of the muscles being placed on or near the trunk, the extreme parts are lightened by receiving only the long, narrow tendons. Hence the long slender legs and the lightness of the wings. Birds having nearly all the same general form and movements, have great uniformity in the disposition of their muscles. Their arms and hands being appropriated to flight, their long neck and head supply their place for the purposes of prehension, and are provided with all the ordinary muscles for their varied and extensive motions, as the straight and oblique muscles of the head, the interspinales and the intertransverales, the spinalis dorsi, the splenii of the head and neck, the rhomboid and scaleni muscles. Indeed, the neck of the bird is like the trunk of the serpent, for its muscularity and flexibility. Although the face is deficient in several muscles from its being protected by the horny mandibles, we observe the powerful mucles of the lower jaw, occupying the sides and lower part of the head; these are strongest in the hard and short-billed rapacious birds, to tear their prey. We observe a singular want of symmetry in the development of these muscles of the lower jaw, on the two sides of the head, in the *crossbill* (*Fig.* 145), where the temporal, the pterygoid, and the masseter muscles are larger on the side to which the lower jaw is usually drawn in a state of rest, and this apparent defect is a beautiful provision to enable this bird to obtain the seeds from the cones of the fir, or from other hard coverings.

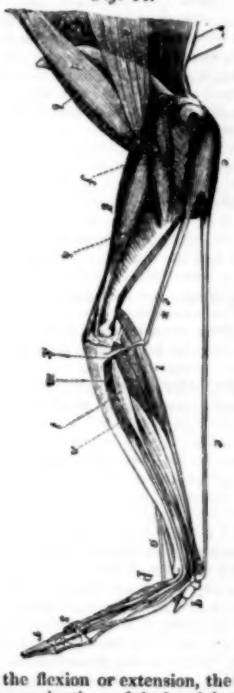
Fig. 145

The progressive motion of the bird through the air depends chiefly on the action of the pectoralis major, or the humerus, and we see that muscle often surpassing in magnitude all the rest in the body, and greater proportionally than in any other class, extending its insertion along a great portion of the humerus, and covering nearly the whole of the fore part of the trunk (*Fig.* 146). It covers the *pectoralis minor* and the *coracobrachialis*, which take their origins also from the expanded surface of the sternum. All the muscles of

Fig. 146

the arm, the fore-arm, and the hand (*Fig.* 147), have their insertions high, and their fleshy portions confined to near their origins, so that only the long tendons are sent down to the points to be moved, and the weight of the member is greatly diminished. Those muscles which are seen on the fore-arm are here abductors and adductors of the hand, which have no effect in the flexion or extension, the pronation or supination, of the hand, but only in adducting or abducting that part of the wing, so as to bring it forward from the ulna, or backwards to the ulna, as in the wrist of the bat. There is but little motion in the phalanges of the fingers,

Fig. 147



either in the first, the middle, or the little fingers. The whole wing, indeed, possesses very little power of pronation and supination, excepting at the head of the humerus, so that it acts with greater security and effect in one direction. The muscles of the back are feeble, and that part necessarily admits of little motion; the straight, oblique, and transverse muscles of the abdomen are also very feeble and short in this class, that cavity being chiefly supported and covered by the sternum. For the strong talons and the powerful grasp of the rapacious birds, which carry aloft their victims to the rocky cliffs, to share it with the young in the nest, the muscles of the legs are continued fleshy to the toes, and thus require the feathers to be continued over them, as in other muscular parts of the body. But in most birds the legs are slender and light as the wings, and have only the long tendons of the flexors and extensors continued to the foot. By the long flexor of the toes passing over the knee and behind the heel, the bending of these joints forces them to grasp mechanically the branches when they are sleeping perched on trees agitated by the wind.

ANATOMY AND PHYSIOLOGY.

LECTURES

ILLUSTRATED BY THE

HUNTERIAN PREPARATIONS

IN THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS, LONDON.

Delivered at the College in 1833, *by*

SIR CHARLES BELL, K.G.H., F.R.S.

LECTURE IX.

MUSCULAR ACTION, AND MUSCULAR CONTRASTED WITH ELASTIC POWER.

GENTLEMEN, I was about to offer an apology for attempting to address you on a subject so dry and so beset with difficulties as that of muscularity. But I find that Mr. HUNTER has taken so much pains to make these preparations before you, and he has made so many experiments illustrative of the facts relating to elasticity and muscular fibre; and when you turn to his works, it is obvious that he thought so much of the subject, that I am sure no apology is necessary, and that you would say it would be a dereliction of duty on my part, if I did not attempt to illustrate the subject of muscularity. Indeed, if you reflect on the advantages which you possess as English surgeons, you will be able to trace back the improvements in surgery, and especially the improvements in the great operations upon the arteries, to the very principles which were arrived at by means of these experiments and dissections of Mr. HUNTER. It is surprising, when you look into foreign books and physiological treatises on this subject, that the important results of his experiments, the important facts which he has given to us, and so judiciously reasoned upon, and which may be summed up altogether, for example, in treating of the elasticity and muscularity of the artery, should be passed over so much as they are, and yet if you examine the chain of reasoning which he has supplied, I am sure you will find no link of it deficient.

You require to know how it happens that the circulation is uniform throughout the body,—how, when the blood has an impulse given to it at one part, it should be propelled with uniform facility over all the parts of the frame; and, again, how there should be a partial acceleration, a partial increase, of the force of the circulation, in particular parts, as they are excited or called into action?

Now is it possible to account for this on the supposition that there is an engine at the centre? This is determined by the engineer, who lays down the rules and knows the laws of hydraulics, to be a matter of certainty. He knows that if a forcing pump be passing fluid along an elongated tube, the fluid will not pass to the extremity of the tube unless he forces it through a shorter tube; and he further knows, that if there be remarkable curves in the course of the tube, the force of the fluid is thereby remarkably retarded. Now if it be universally assented to, if it be known, that any force operating on a column of fluid, passing through a set of vessels, will be retarded in proportion to the length of the vessels, how can you account for the circulation of the blood without reverting to the observations of Mr. HUNTER? Mr. HUNTER has distinctly shown us, that there is not only an elastic pump in the body, which is a dead power, but that there is also a muscular power, resulting from the life of the part, which is perfect during the life of the animal, and dies with the animal.

Most extraordinary is it then, that all this is, as it were, left out, passed over, by writers; the structure of the artery being considered as something in itself inexplicable. I must not, I believe, in the present session, go over the whole of the proof, again, which might be adduced

on this subject, because that would be just repeating the lecture which I ventured to deliver last season: but I must partially return to it. There are certain facts regarding the muscles which it is necessary to take up anew. Let me say then, that the present lecture will be on the muscles, and the muscular power in contrast with elastic power.

Mr. HUNTER has marked this down, that muscularity is, as I have stated, the property of *life*, and, adverse from this, that elasticity is always the same under the same circumstances. If the elastic body be moved from its right form, it exercises its power, and uniformly exercises it; whereas the muscular power is regulated to the utmost degree of nicety, and acts repeatedly. As to the chemical composition of muscles, I am afraid we shall make nothing out of that in attempting to explain muscular power. We shall find that the fibrine of blood and the fibre of muscles are of the same chemical composition. Nay, some go so far as to allege, though I must confess I can scarcely credit the fact,—that the fibrine of blood being excited, the muscular fibre acts upon it. Were that the case, it would relieve us from much difficulty. On the other hand, it is imagined, that irritability, or muscular power, belongs to a foreign body. Now you are quite aware that when lymph is discharged, it presents shreds and not fibres; and I allege that muscular fibre is the only proper fibrous texture of the animal frame. At all events, it is that which is endowed with irritability, and which has the power of originating action or motion.

Some experimenters have cut out a muscle, and they have supposed in examining it that they were experimenting on a muscle as a distinct part. The first thing that you must consider is, how this muscle, separated from the body, is constituted. You remember that the tendinous origin and the tendinous insertion are connected by a tissue of cellular membrane with the bones, and that the particular matter which we are now to consider, the fibre, is introduced between the tendons in regular minute sheaths of cellular texture. You remember, further, that the nerve, the artery, the veins, and the lymphatics, enter this muscle, and are conveyed into its interior, with the fibre, through the cellular texture. When, therefore, a muscle is separated and experimented upon, you are not, in fact, experimenting on a muscle merely, but on a muscle having all the nervous tissues and other parts along with it, and you are not at liberty to determine that the muscle has power to receive an impression independently of the nervous tissues so connected with it. On the contrary, if you consider that the fibres of the muscle, however minute, however numerous, amounting even to millions, and acknowledge, as all do, that no one fibre is connected with another, but that each lies insulated in a little sheath of cellular texture,—how is it that the fibres of the muscles contract with one impulse? How is it that they all combine in one simultaneous movement? Does it not imply that there is some bond of union? Does it not imply, fairly enough, that the nerve is that bond of union? that the expanded matter of the nerve which enters the muscle, forms a kind of union between these fibres? In short, that it is the nerve which gives sensibility, and communicates an impression to every fibre of the muscle? So far, then, I have refuted the idea, that when a muscle is cut out of the body, you are then experimenting on a muscle possessed of nervous influence.

I ought perhaps to notice, that if the muscular fibre be looked to narrowly, and inspected with a microscope, you find, first, a fasciculus of muscle consisting of fibres, and these fibres declining in size and magnitude, until they all escape from the detection of the microscope. Examinations of this kind have been made under the idea that the examiner would discover an ultimate fibre, and ascertain its texture, and, upon this hypothesis, if I may so call it, the nature of the motion of the muscle. But I must observe, that all these experiments, regarding the texture of the fibre, are without ground. There is no proof that a muscle swells from contraction. When Mr. PEARSON read his lecture on this subject to the Royal Society, I said the thing was not determined, and that if it were required to be ascertained whether the muscle swells in action, the proper way to proceed would be, for example, to put the heart of a turtle into a glass filled with water, and place over that another glass, with a narrow tube attached, the water rising partly in the tube. The heart might then be stimulated, when it would be ascertained whether the condition of rest, or that of action, would produce a swelling of the muscle—whether contraction or relaxation would elevate the water. I believe this experiment has been tried, but it was made by an authority which I shall be excused for dismissing altogether.

Without, however, considering whether the fibre swells during contraction or relaxation, a variety of the most ingenious hypotheses have been offered on the subject. Now one cannot but recollect that there are other properties of living matter which are not known, but yet such as you

would imagine would be more obvious to us. Even the nature of elasticity is not known. Philosophers have spent their time in every age in attempts to discover what elasticity is, but they have failed to detect on what it depends. The history of philosophy, in all its departments, proves the futility of such inquiries. When men endeavoured to discover the cause of motion, instead of observing the laws of motion, they made no progress, and no discovery of consequence regarding motion was made, until men arose who were possessed of sufficient strength of mind to put that question aside altogether as a thing inscrutable, and set themselves to observe the laws of motion. The subject is equally difficult with regard to muscular fibre.

The next thing that is a little amiss in the history of this subject, is the supposition that the nerve is liable also to contraction, like the muscle. This is the idea of the great commentator upon Mr. Hunter, Sir Everard Home. He cuts the nerve, and it contracts, and from that he adduces the hypothesis, that the common power of sensibility in the nerve, is the power of action. There is nothing against which we must guard more than this analogy, I must say this false analogy. There is, in the first place, no proof of self-motion in the nerve. All that is observed is referable to elasticity, but not of the nerve. The radial nerve, when it is divided, contracts, but it contracts through the elasticity of the cellular membrane around it. Everybody who cuts off a leg, knows full well that there is contraction in every part that is divided, but there is the least contraction of all in the nerve. And so with regard to the eyes. It is imagined that when an impression is made on the optic nerve, on the retina, that it retires, is again advanced, and again retires. It is conceived that the nerve, on being excited to action, acts as a muscle would do. But this is inaccurate. I could prove, were it proper to do so at this moment, that the advance and retreat of the nerve depend on the action of the muscles of the eye, much more than on the condition of the nerve. But suppose that the nerve acts as the muscle acts, what excites it to action? There is an impression made on it, and it acts. The impression implies sensibility in the nerve. Now is it not sensibility to impression that we are in search of? We want to know what the sensibility to impression is, and as there must be sensibility before the impression can produce action in the nerve, you see we are getting wide of a philosophical mode of investigation in pursuing this subject. In short, we are led into error by taking up a false analogy. The function of a nerve is one thing; the function of a muscle is another.

The next thing we have to notice, in order fully to comprehend and use the important points which Mr. Hunter has transmitted to us, is this,—Has each muscle, either from structure, or its connexion with a nerve, a peculiar character attached to it? It may be asked, upon what does its particular action depend? You know full well, that if the limb of an animal be cut off, and then excited by galvanism, or some other power, that it will act to a certain extent, and, having acted, it presently ceases to do so. But if you cut out the heart of an animal, and excite it in the same way, it acts, contracts, relaxes, and contracts again, and continues a succession of actions for a minute or more. Now, in these cases, we have two different kinds of action, the action of the heart not depending on its social relations. The several muscles then have different kinds of action, and the determination of this does a great deal towards explaining the nature of the iris for if you treat the iris as a common portion of a common muscle, you will be surprised that you cannot make it act. Its action is connected naturally with the condition of its nerve, without which it will not act.

We turn now to the observations of Mr. Hunter on the muscularity of arteries. He has shown that they contract. He has shown that they consist of fibre, and that they change according to the condition of the animal. You will not permit it to be said that an artery is muscular, because it will not act with the muscles. It is not the property of muscular fibre to be so put in action, but it has a property of contraction dependent upon life.

Taking then the fibres to be possessed of this peculiar property—contraction,—I fancy, in the next place, we must observe the opponent muscle. This is a curious and very interesting subject. I have here a diagram which will serve to illustrate this, and it puts me in mind of what a very ingenious and learned author says in admiration of muscular action. The muscles are opposed to one another as flexors and extensors, but, says he, it is beautiful to observe that they act like two men in a saw-pit; while one pulls, the other relaxes, so that no power in one muscle is exhausted by the action of another. This is very true, but it is not enough. It would be strange if the exhausted flexor muscle were overcome by the extensor. The extensor relaxes its action, but it does not do so like one of

two men when sawing, one throwing up the body altogether relieved from action. The operations in a sawpit, in fact, convey but a very imperfect idea of those of opposing muscles. There is an excitement of the flexor muscle, and so there is of the extensor, but the extensor gives up its influence in the precise degree that the flexor is excited. It is easy to see that it must be so, and the fact is readily proved in this way. Take the tendon of a fleshy muscle, make a little incision in it, append a thread to it which is passed over a pulley; let a weight, just sufficient to draw the tendon straight, be appended to it, and you will find, that although the tendon be quite behind the joint; as you bend the joint, or extend it, the weight will rise and fall; that is to say, in every condition of the limb there is a due degree of action in the flexor muscle, and, moreover, the opponent muscle being excited, the other goes down. Thus the muscles correspond with each other, and the condition of action or relaxation which may be considered as given to one, is given to the other.

On this head Mr. HUNTER has an interesting observation, which I intreat you to notice. Passing from the consideration of the two classes of muscles, the flexors and extensors, he illustrated others, and among them the sphincter muscles around the eyes, showing that they differ from other muscles, inasmuch as their natural state, their excited condition, is that of relaxation. For example, the orbicular muscle of the eye is in excitement, that is to say, in action, during the repose of sleep. This is a subject which I may, perhaps, have occasion again to take up, and with a little more interest than I can give to it at this part of our progress.

The next observation of Mr. HUNTER is very important, for we are always imagining that the state of contraction is a state of action; but you will recollect, that when all excitement is removed by death, the muscle acts, and it is the last thing that does so. When all excitement is withdrawn from it, it is in a state of real action.

Having thus considered the muscles generally, I fancy I must in the next place remind you of a certain relation which the fibre bears to mechanical laws. The first thing for us to notice is, the manner in which the fibre runs, which it almost universally does with a certain degree of obliquity; in other words, power is lost in order to gain velocity. You remember, that in all mechanical operations, these two must be in operation, – motion equal to weight, and weight equal to motion. This may be easily demonstrated. When the fibre runs obliquely from the origin to the insertion, it loses power, but it gains what is material to our present object. Power is exerted through a greater space in the same time. Velocity, therefore, is gained with the loss of force.

Another fact that I may incidentally observe is this,—the fibres are all absolutely, or nearly, of the same length. I am not prepared to say whether fibres of a disproportionate length in the same muscle would act if they were so constructed. We know, that when the gastrocnemius acts unequally, the tendon is torn. The rupture in general is not the result of a full operation of the muscle, but a partial operation. I rather suspect that one object of this construction of fibre may be seen in this effect, but I repeat we should not be satisfied with one object; and another object, therefore, of this direction of the fibre, and the relation of the tendon running through the substance of the muscle, is to give rigidity to the muscle. One can imagine that the rigidity of a limb gives it a more intense action.

The next thing that I wish you to notice is illustrative of the same principle,—the loss of power and the velocity gained by it. Suppose this [referring to a diagram] to be the deltoid, and this the radius. The deltoid acts with great disadvantage as a mechanical power, because it is inserted so near the centre of motion, and has to move so long a lever; but as the muscle acts not with one impulse, but with a succession of impulses, when it has once moved the arm, having a hammer, for instance, in the hand, once overcome the *vis a tergo*, the inertia, its successive impulses gain velocity, until, at length, considerable velocity is acquired in raising the arm. But suppose the arm were to be pulled down by all the muscles of this part. There would be a very considerable velocity gained by the descent of the hammer, which will pass with increased velocity as it descends. The weight of the hammer, therefore, increases the velocity, and so will the muscle increase in its power of drawing down the arm, and giving a blow with the hammer, or a stroke with the saw. Here, then, the two powers are united in giving velocity; and if you consider that the velocity and the weight are always increasing during their operation, there will be some difficulty in calculating the velocity with which the hammer finally descends, compared with the slowness of its first motion.

We at once perceive, then, how the power of the muscle (I was going to say, is sacrificed, but that is not the case) is given up, resigned, or exchanged, rather, for the property now required, viz.,

velocity, and you find that this is necessary in many instances of machinery. You can imagine, that in certain processes effected by machinery, the force is not sufficient, and a more powerful impulse is required. In addition, then, to the machinery, we have the fly-wheel, which is at first moved round very slowly, because it is very heavy. This wheel, however, does at last move, and, upon the principle I before stated, every moment of its motion accelerates its swiftness, and so it goes on until this wheel at last obtains such an impulse, that it almost disappears from the sight. Unless its power be well calculated, the machinery would be broken up as by an explosion of gunpowder. Now the use of this wheel is to accumulate the impulse of the lesser wheel, until such a power is obtained that you can cut through a piece of metal, or stamp or coin with the machine. The same principle is displayed in our bodies. Muscular power is lost in the hand, but velocity is gained to it. The tendons pass over points of the fingers, by which there is a loss of power, but a gain of velocity, and when that velocity is acquired, we can employ the different muscular powers of the hand. It is this acquired velocity that enables us to knock in a nail, and all the work done by the fingers is executed by a due combination and interchange of these two powers, the force of the muscles, and the regularity and velocity of motion gained by the direction of the tendons. I will not detain you by further illustrations on this subject; but, doubtless, some of you will feel an inclination to follow it up.

Let us now pass to the classification of the muscles, which may be divided into voluntary and involuntary.

I need not tell you that one set of muscles acts under the will,—is dependent upon the act of volition,—and that all the various operations of the body which they perform, are subject to the mind, while there are other operations of the body, which are altogether withdrawn from the superintendence of the mind. Is this a property of the muscle, or does it belong to something else? I think it is easy to resolve this question. We have only to be assured that there are muscles which perform two distinct offices, the one voluntary and the other involuntary, when it at once occurs to you that the muscles of the body themselves, like the muscles of the shoulder and the muscles of the chest, are muscles of volition. But the muscles of respiration act when we are asleep, as well as when we are awake. Is it, then, that a different relation of the nervous system is established in them? If we find the pectoral muscles at one time acting under the will, and at another time acting independently of the will, as, for instance, when a person is asleep, or attacked with apoplexy, or when an animal has its head severed off, it is clear that the same instrument is in operation, influenced by a distinct power. Some have endeavoured to explain this by showing, that if a person who is asleep be disturbed, though he is only imperfectly conscious, he moves away, and they have proceeded with a series of observations to prove, that this motion during sleep, and, consequently, the vital operations which proceed during sleep, depend upon sensation and volition. But it appears to me that when, for example, the cerebellum is taken away, or such a blow has been given on the head as to destroy all capacity of receiving sensation or exercising volition, though the more common power is gone, the other remains. I cannot admire the course of reflection which leads to the opinion I have alluded to, because I think it is much pleasanter to observe that nature intends certain operations to be under the direction of the will, and others conveniently withdrawn from it,—that while we have all the voluntary muscles and all voluntary action directly subject to the influence of the mind, there are other vital operations which are necessary every moment for sustaining life, and which are happily withdrawn from the influence of the mind, and are left undisturbed by passion, calmly and imperceptibly—at least calmly and quietly—to perform those actions which are essential to life. Indeed you might carry this yet further. It is impossible not to observe the care exercised by a parent towards its child, by a nurse towards an infant; but push this a little further, and you will find that there are a hundred instances of care, of little unnoticed provisions by which you live, and without which you cannot live, and which all the care of a parent, all the anxiety of a mother, so far from providing for, hardly comprehends. Gratitude, therefore, pursued in this direction, would bring you to something beyond it. You may see illustrations of the unconscious acts of the frame in very many other instances; for example, in respiration, deglutition, speech, coughing, sneezing, all of which are performed independently of volition, and yet through the media of muscles which are every moment used by volition. Thus I apprehend we must come to the conclusion, that the same instruments in the body are perpetually exercised by different powers, sometimes acting under the will, and at others with a distinct impulse coming from a different source.

An observation may be made with re-

gard to tardigrade animals, which seems to be appropriate to the conclusion I have just stated. It is supposed that the motion of the tardigrade animals is provided for by a certain peculiarity of the circulation, and that upon the slowness of that the slow motion of the animal depends. I object to that. Every animal has, according to its instinct, according to the property of its body, the power of moving itself so slowly, that you might compare its progress with the motion of a watch. The tardy motion of the animal is not owing, therefore, to any defect of the muscles, nor to any peculiarity in the circulation, but it is an appropriation of the animal's action to its powers. For example, one animal will catch its prey with a rapidity of action which we can scarcely see, and can only hear. Another will strike out its lip or tongue with a motion which you are unable to observe, giving no alarm, but by which it securely lays hold of its prey.

But the point to which I particularly wish to draw your attention is, the assertion that proof exists, that these slow-moving animals have a peculiarity in their circulation,—that the arteries divide at certain points, and then join again at others. Now the preparations before me do not decide this matter, but I learn that it is the opinion of Professor Macartney, that it is not true that the artery divides. Certainly one vessel goes out of the other, but these vessels do not join again at the trunk as in a centre. But taking it for granted that there was this peculiarity in the course of the arteries in the muscles of tardigrade animals, how could we argue therefrom that nature is seeking to impede the course of the blood, and thereby causing the animal to be slow in its motion? The muscle that is slow in motion is powerful in its grasp. I point out this as the first objection. And, secondly, if nature intends to retard the blood, what is there to do but to diminish the size of the vessel? That is the usual course of impeding its progress. But here it is alleged that there is a number of vessels which pass off tortuously, and certainly we do find that to be the case with some small vessels going to the brain, and it is asserted too, of some vessels which go to the muscles in the lower jaw. Now with regard to the jaw, it is possessed of extraordinary strength, and is not more extraordinary in that respect than in the firmness of its action and power of retention. In fact, it lays hold of its prey, and fixes it as in a vice. But I cannot conceive that the artery by being divided, or being tortuous in its course, retards the blood, because such a cause and effect are at variance with everything that occurs in life. Take, for example, the artery of the temple, and that of the leg. Compare them together, and you will find the artery of the head tortuous, while the artery of the leg is straight. Now if the tortuous form of the artery was meant to retard the blood, is it not strange that the tortuous form occurs at the upper part of the body, where the blood is driving against its gravity, and not given at the lower part of the system, where it has the additional impetus of its own weight? Take an instance from a tumour on the head. I am satisfied that there is not a surgeon present who does not know that as sure as a tumour grows on the head, the artery of the temple becomes more distinct by the volume of blood passing through it, and also more tortuous. Is it possible to imagine that this tumour is growing rapidly because the blood is retarded?

Now if you touch the tortuous artery you feel an unusual impulse, an unusual extension or dilatation of it. Is not this the property by which the circulation is equalized all over the body? If the artery go down to the toe with a rapid circulation, equal to the supply of due nourishment for the life of the part, how is it that there is the same facility of passage for the fluid in the one case as in the other? There must be some additional power at the centre, in order to equalize the force of the two. What does Mr. Hunter show? Just this, that as the artery lengthens, it becomes muscular. He has proved beyond a doubt, he has made dissections, and has shown that the artery, the farther it proceeds from the heart, becomes more muscular and less elastic. If then you admit that the distant parts have more muscular arteries, in order to make up for the exhausted action of the heart, I cannot see why you should refuse to admit that a tortuous artery which is enlarged, is the means of accelerating the progress of the blood, and giving the animal that vigorous circulation in a particular part which is necessary to the performance of its functions. If the animal have to hang by its feet, and at all times vigorously to check itself by the flexor muscle, does it not accord with the whole phenomena of the animal body that it should have an artery of large size, and that this should be tortuous and more highly muscular, so that the circulation may be consistent with the vigour and action of the muscle? Whether the action of the brain itself, the sensibility of the eye, the action of a muscle, or whatever other duty of life be considered, all depends upon the vigorous circulation of the blood.

I will mention here one more point, because I wish that some of you would take up the subject and investigate it by experiment—viz. the difference of our sensations when they are not acted upon by the muscles of volition, and when they are acted upon by those muscles. An instance which I will give you to proceed on is this:—If you have a heavy weight on the shoulder, and are raising it up straight, you feel much fatigue, and a great effect of the exertion you make; but suppose you place yourself in such a way that the weight is not raised by the shoulder, but by the act of the will; you will then raise it with much more ease, and without being sensible of anything more than its pressure on the body. It seems to bring the muscles into operation as vital parts, without a consciousness of effort. If you raise it up by violence, you have all the sensation of the weight; but if you raise it up merely by drawing in your breath, you do it easily. In fact you thus raise a great weight without much difficulty. This may mark the distinction between the muscles of volition and those which have a different function, and minister to the necessities of the system.

You can easily conceive the difficulty of treating these abstract subjects, and therefore at the next lecture I hope you will allow me the opportunity of a little demonstration. I shall then enter upon the subject of expression, and I venture to suggest that when we are considering a series of expressions, we are preparing ourselves for observing disease with effect.

HOTEL DIEU, PARIS.

CLINICAL LECTURES ON SURGERY

DELIVERED BY

BARON DUPUYTREN,

During the Session of 1833.

Revised (before translation) by the Baron himself in the fasciculi of his "Lecons Orales de Clinique Chirurgicale," published periodically by G. Baillière, Paris.

ON FALSE ANEURYSMS OF THE BRACHIAL ARTERY.

(Concluded from page 380.)

CASE 2.—A hawker, about 32 years of age, and of a dry and strong constitution, was bled for a violent headach; the right brachial artery was opened at the same time with the vein. The surgeon recognised the accident by the scarlet colour of the blood and the alternate elevations of its stream. He permitted the blood to flow until the man fainted; after this he applied strong compression, sufficient to prevent any new hemorrhage, and recommended the patient to continue it, without informing him of the nature of the accident. The wound made in bleeding soon healed, and the patient, thinking that all danger had passed away, suspended the compression. A tumour now appeared at the fold of the arm, and acquired daily greater magnitude. When the patient entered the hospital, it was as large as the fist; it was round, uniform, circumscribed, fluctuating, and presented movements isochronous with those of the pulse. These movements, which were very manifest when the limb was flexed, ceased entirely on its being extended. Compression exercised above the tumour also arrested them. These facts proved, 1st. That the opening made into the artery was small; 2nd. That it did not communicate directly with the aneurysmal sac; 3rd. That the tumour received blood by one vessel only; and, 4th. That the greater part of the fluid contained in it was coagulated, and, consequently, that compression, if well applied, might effect a cure. This method was therefore tried, and seconded by the application of ice, but as it failed to produce any sensible amelioration, the operation was had recourse to at the request of the patient. In the present instance the operation was performed in the amphitheatre before the pupils. The patient sat in a chair, and M. DUPUYTREN placed himself behind the arm, in order to permit the pupils to see better; he then determined the position of the artery, and made an incision two inches long, about the same distance above the vessel; he now divided slowly the skin, subcutaneous cellular tissue, aponeurosis of the arm, inner edge of the biceps, and, finally, came to the cellular sheath enveloping the artery and nerves. The sheath was gradually divided on a grooved sound, which also separated the artery from the median nerve to which it was contiguous. This part of the operation was completed in a few minutes; but on the instant the patient fell into a state of semi-syncope, the pulsations of the heart diminished, and those of the artery were completely arrested. In this state an error was to be apprehended, and for a quarter of an hour the operator hesitated between the nerve and artery. The circulation, however, soon became re-established, and the isolated body was recognised to be the humoral artery: a ligature was passed under it, and before being drawn tight, the operator assured himself that it was capable of arresting pulsation in the tumour, and that the patient experienced

no pain. The lips of the wound were united by slips of plaster; a simple dressing applied, the patient carried to bed, and the tumour covered with ice.

In the evening the skin of the limb had recovered its natural temperature, and the patient passed a good night; he merely complained of a pricking in the fingers. The next morning pulsation was felt in the radial artery, then ceased, and again returned. The application of ice was continued. On the 5th day the dressing was removed, and we discovered the existence of an erysipelatous inflammation, which subsequently extended to the arm and fore-arm. The ice was now suspended, and the inflammation combatted by blisters placed over the points most affected. This remedy succeeded in removing the erysipelas. On the 8th day the tumour opened spontaneously, and discharged a mixture of pus and blood for several days. On the 10th the ligature came away without any hemorrhage. On the 15th day the different openings which existed in the aneurysmal tumour were enlarged by a single incision, and the clots of blood removed. Some hemorrhage now supervened, which was arrested by plugging the wound. Suppuration was fully established on the following days, and the dressing being changed, nothing came away except pus. From this moment the wound began to contract; the opening through which the ligature was discharged cicatrized, and there merely remained a small opening leading to a narrow cavity, the remains of the aneurysmal sac. The motion of the arm and hand was gradually recovered, the patient was able to write to his friends, and he left the hospital perfectly cured, after two months' treatment.

Remarks.—You may, perhaps, be inclined to ask whether the forcible extension of the arm, by which the pulsations of the tumour were arrested, if assisted by the application of compresses and ice, might not have rendered the operation unnecessary. But this constant extension would have been extremely fatiguing and painful, and might have given rise to anchylosis of the joint. Compression and cold would, doubtlessly, have been useful, but it would have been necessary to continue their use for a very long time; besides, these two means are not always free from danger. The operation, such as it has been described, was adopted after a careful examination of the tumour, which removed all idea of a varicose aneurysm. Its duration was occasioned by the fainting of the patient, and by the inconvenient position in which he was placed. I myself was obliged to remain for a long time bent in a most fatiguing posture, and the manner in which the patient's arm was extended horizontally, caused the blood flowing from the divided parts to trickle into the bottom of the wound and obscure the view. Thus the difficulties, which in this case I created myself in order to afford you better opportunity of witnessing the operation, should not serve you as a rule of conduct. For such an operation as this, the patient should be laid in bed, and his arm, placed freely in supination, should present to the surgeon a surface readily accessible to his fingers, instruments, and eye.

The phenomena which pass during the re-establishment of the circulation by the anastomosing branches, have not been well understood. I have satisfied myself that the blood arrives below the ligature for a long time before the artery presents any pulsation. The distention of the vessel and development of its elasticity constitute the first period of the re-establishment of the circulation; after this we perceive a slight thrilling, which is very irregular, both in respect to strength and quickness. This reappears after a longer or shorter interval, and indicates in a certain manner the return of the heart's influence. This second phenomenon, which has always been regarded as a proof of the success of the operation, may disappear after some time; thus I have, in many cases, seen the circulation arrested fifteen days, one, two, or three months, after the operation, and gangrene supervene; but I should at the same time remark to you, that I do not know a single example of gangrene following the ligature of the brachial artery, when the nerve was not tied. The most common accident which succeeds this kind of operation, is the re-establishment of the circulation in the tumour, and when this takes place, we must tie both ends of the vessel. The erysipelas by which our patient was attacked deserves your notice. In this case, as in many others, the employment of blisters was attended with complete success. I shall make but one observation on the removal of the ligature; it came away on the tenth day, while in the case of another patient, operated on, at the same time, for an aneurysm of the crural artery, the ligature did not come away before the 25th day. You can readily understand how the period at which the ligature is discharged must vary according to the caliber of the artery, the degree of pressure exercised by the thread, and the greater or less quantity of cellular tissue which it embraces.

Case 3.—A young man, twenty-two years of age, was bled in the median basi-

lic vein by a physician, who transfixed the artery through the vein; a scarlet-coloured stream immediately issued with great force from the wound. Having at once perceived the nature of the accident, he applied over the wounded point a graduated compression, which at first arrested the hemorrhage, but it soon returned, and was several times renewed. The patient now presented himself at the Hôtel Dieu, and nine days after the injury a tumour of the size of a nut, soft, fluctuating, and pulsating isochronously with the heart, was perceived at the bend of the arm. On compressing the artery above, the pulsations were arrested; when the vessel was compressed below, they, on the contrary, increased. The existence of an aneurysm was thus clearly indicated. The wound in the vein was healed, and nothing led to the idea that the latter vessel communicated with the artery. As the ligature was the surest means of alleviating this unfortunate accident, it was practised on the following day. The patient was placed in bed, the arm being in a state of supination, and an incision two inches and a half in length was made along the course of the artery, above the joint. The subcutaneous cellular tissue was now found infiltrated with blood; the fibro-cellular sheath, which encloses the artery and median nerve, was thick, dense, and easily torn; a large vein running across the incision was divided, and the vessel and nerve were exposed. A ligature was passed between them by means of a grooved sound and stylet, and we thought that nothing was embraced in it except the artery; however, on raising up the two extremities of the stylet, in order to assure ourselves that the vessel alone was comprehended, the patient experienced great pain, followed by numbness along the branches of the nerve. The artery was now separated from the nerve by a careful dissection, and the ligature drawn tight; this occasioned no pain whatever; the pulsations of the tumour instantly ceased, and the circulation was arrested in the fore-arm. The edges of the wound were now brought in contact, the thread was placed in one of the angles, and some lint with a bandage was applied. This case soon terminated favourably; the fore-arm always preserved its natural colour and temperature. On the third day pulsation commenced in the radial and ulnar arteries, but did not extend to the tumour. On the tenth day the ligature came away, and on the nineteenth the patient was able to leave the hospital.

Remarks.—This case, Gentlemen, gives rise to several reflections, and may serve to show you how ligature of the radial artery, which is generally regarded as a simple and easy operation, may present several difficulties. If you regard only the rapidity with which you may come down upon the nerve and artery, the operation will appear a quick and easy one; but the most essential point, yet one which was formerly much neglected, is to isolate completely these organs from one another, and to avoid wounding any other branches which may happen to pass under the instrument. Hence I prefer to spend a considerable time in dissecting the artery completely from the surrounding nerves, to running the risk of embracing them in a rapid operation. This patient presented you with a new example of the success obtained in cases of a wounded artery, by the application of a single ligature between the heart and the injured point; but all patients are not so fortunate, and in a great number of circumstances the surgeon is forced to tie the vessel above and below the wound, in order to save his patient from the danger of secondary hemorrhage. The following case is an illustration of this:—

Case 4.—An envoyé from Brazil, recently arrived at Paris, was mending a pen in his study, when the knife escaped from his hand, was projected several feet into the air, and fell with the point on the anterior and external part of the left fore-arm; the sharp blade penetrated the skin and subjacent parts, and opened the radial artery. Abundant hemorrhage took place. A surgeon was immediately called in, and hoping that pressure might be sufficient to obtain a cure, he applied graduated compresses, and a bandage from the fingers to the elbow; this apparatus remained on for several days without being removed, during which time no loss of blood took place; and when it was at length changed, the external wound was found to be healed; but an aneurysmal tumour was formed, and the surgeon hoped to remove this also by long-continued pressure. In this he was disappointed; the tumour not only remained, but acquired increased volume; I was now called in, and thought that the radial artery should be tied; the patient consented, and the operation was immediately performed; one ligature only was placed above the tumour, which ceased to pulsate as soon as it was drawn tight; the circulation was also arrested in the arteries of the fore-arm. We now proceeded to dress the wound, but this had scarcely been finished, when the circulation was re-established in the inferior portions of the ulnar and radial arteries, and the tumour presented pulsations exactly similar

to those before the operation. It was therefore indispensable to tie the artery below the aneurysm; this was done, and in fifteen days the patient was perfectly cured.

Case 5. A wine merchant, 45 years of age, of good constitution, but subject to hæmoptyzy, was bled by his usual attendant: the lancet had been scarcely introduced when the blood flowed in jerks: a strong compression was now exercised, but without success: and a month afterwards, when he came to consult me, there was an enormous tumour in the folds of the elbow. The operation was urgent, and instantly performed: pulsation ceased in the tumour as soon as the ligature was drawn, though some thought they felt a slight oscillation in the radial artery. During the night succeeding the operation the patient was seized with a violent spitting of blood, which compelled Dr. Max to bleed him twice. It is not a rare circumstance to witness symptoms of plethora, or even hemorrage, after the ligature of large arterial trunks; sometimes the patient is affected with palpitation, dizziness, oppression, &c.; sometimes with epistaxis, hæmoptysis, &c.; in all these cases one or two bleedings are generally sufficient to remove the accident. It was remarked in the present instance that pulsation was very soon felt in the radial artery, but not in the tumour, a disposition depending no doubt on the influence of the capillary vessels. Experience teaches us that it is by no means a favourable symptom to see the numerous anastomoses which exist between the two ends of the artery, re-establish the circulation too promptly, because in certain cases this rapid return of blood may bring back the pulsations of the tumour. This, however, was not the case in the present instance, for the patient left the hospital cured about four weeks after the operation.

Concluding Remarks.—I shall terminate this lecture, Gentlemen, by a remark which is the fruit of long observation; viz. that an artery may be tied above the injured point with almost certain success, if the lesion be recent, and of such a nature that the edges of the wound made in the vessel resemble a fresh wound disposed to unite: on the contrary the ligature presents much less chance of success when the lesion is old, and its edges are cicatrized, and consequently incapable of taking on the adhesive inflammation. In the first case, ligature of the superior portion of the vessel is sufficient, whether the effused blood be in communication with the external air or not: while in all other cases we must tie both ends of the vessel. I know of no exception to these rules except when the injured artery is situated at the extremity of a limb, when the numerous and varied anastomoses render it necessary to tie both ends. Perhaps this theory may give you the explanation of some facts which have up to this time appeared difficult of comprehension.

OPERATION OF TRACHEOTOMY, SUCCESSFULLY PERFORMED, FOR THE EXTRACTION OF A PIECE OF BONE FROM THE BRONCHUS.

To the Editor of The Lancet.

Sir,—Several years ago there appeared in your periodical a case of a somewhat similar nature to the subjoined. That case, unfortunately, was not brought to a happy conclusion, in consequence of the patient becoming apoplectic during the operative procedure. The following instance of complete success will probably be acceptable to the majority of your readers. It is transmitted with Mr. Liston's concurrence.

I am yours, &c.

James Duncan,
House Surgeon.

Royal Infirmary, Edinburgh,
May 26th, 1834.

Case.—Mrs. R——, ætat. 37, admitted into the Royal Infirmary, Edinburgh, on the 12th of May, 1833.

On the 1st of November last, while swallowing some mutton broth, she felt a small piece of bone get entangled about the root of the tongue. In making some violent attempts to extricate it by coughing, it passed, during an inspiration, into the larynx. Immediately on its entrance she was seized with a severe fit of coughing, a sense of impending suffocation, and a sharp pain, referred to the right side of the larynx, about the cricoid cartilage. The fit of coughing continued for two or three minutes, and then ceased entirely; the respiration became comparatively easy, and she felt the substance passing down the trachea, the pain following it, and leaving the parts where it was first perceived. It appeared to lodge at the upper part of the sternum beneath the right sterno-clavicular articulation, and gave rise to much annoyance, from difficult breathing, noisy inspiration, and a painful sense of rawness felt there when coughing. The dyspnœa has continued to be extremely troublesome since the accident, and to be

increased by the least exertion. It has been particularly urgent during changeable weather, and her sleep has been all along much interrupted by it. From the time of the accident until about three months ago she had no return of the cough, but about that period she had three or four violent fits during one day, produced, as she describes it, by the feeling of the presence of a foreign body in the trachea, at the upper part of the sternum, rather to its right side. After this the dyspnœa became extremely urgent, but she had no further uneasiness from the cough until about three weeks since, when it again returned with increased severity, and continued to be very distressing until a few days before her admission into this hospital. She has consulted several medical men, both in the country and in Aberdeen, but they all looked upon her complaints as being either asthmatic or imaginary, and refused to employ any but palliative means. During a slight remission produced by these, she came to Edinburgh and applied to Mr. Liston, to see if any thing could be done towards the removal of her complaints.

The following was her state on admission:—The respiration was stated to be more tranquil than it had been for some time past, an improvement ascribed to the application of a blister about ten days previously. It was not much hurried, but became so after very slight exertion, even, at times, by speaking a few words continuously. It was noisy and stridulous, particularly during inspiration. The chest all over was natural on percussion, and the vesicular murmur was unattended with any morbid sound, except a little below the sternal end of the right clavicle, where, when the respiration was at all hurried, there was, over a small spot, a pretty loud sonorous râle. The sound was heard over the superior angle of the right scapula. In other respects both sides of the chest were perfectly natural, and the respiratory murmur was equal in both.

There was no complaint of pain, but the same sense of rawness formerly mentioned was still felt on coughing, and during her attempts at expectoration. Her sleep is still disturbed by the difficult breathing. Towards morning she occasionally expectorates a mucous fluid tinged with blood, and in her attempts to discharge it, she feels as if it were obstructed by something acting as a valve a little below the right clavicle. Deglutition is unattended with any pain or uneasiness. Her appearance is expressive at times of considerable anxiety, and she feels assured that the foreign body is still lodged in the air-passages, and places her finger over the spot where she supposes it to have been fixed all along. Her general health is not much impaired.

Mr. Liston, from her own account, and from an investigation of the symptoms on her admission, was of opinion that the body still remained, and was the cause of her distress; and from the knowledge that, on account of the greater size of the right bronchus, and the more obtuse angle which it forms with the trachea, foreign substances most frequently pass into it, and also from the indications afforded by auscultation, he was satisfied that it was lodged on it, and entertained strong hopes of his being able to remove it by operation. The patient herself was willing to submit to anything for relief.

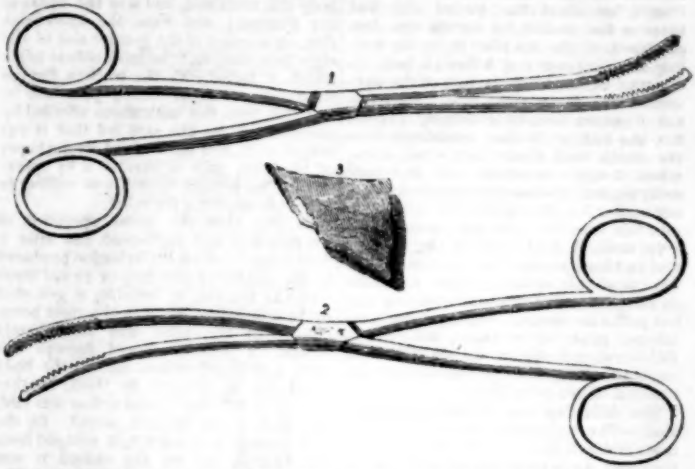
On the 14th the usual operation of tracheotomy was performed, and after a little delay, to allow the irritation produced by the admission of a drop or two of blood into the trachea to subside, a gun-shot probe was passed down to the right bronchus, and the bone was immediately struck. A pair of curved forceps was then introduced twice, but as the body could not be grasped by them, another pair of a different construction was tied, by which it was at once seized. In the first attempt to extract it, it escaped from the forceps, but on the second it was brought out without much difficulty. The passing of the instruments produced violent fits of coughing, with heaving of the chest and lividity of the face. The removal of the bone gave instantaneous relief, the respiration became perfectly calm and easy, and the stridulous inspiration ceased entirely. The patient submitted to the operation with great fortitude, and nothing could express her joy at its happy termination. Immediately after the operation, the wound was dressed with lint moistened with warm water, which was frequently renewed. In the evening, when the oozing from the incisions had entirely ceased, its edges were brought together, and retained by means of the isinglass plaster.

May 15. States that she has slept better during the last night than she had since the accident; the wound is looking well, and a small quantity of air passes only occasionally through it. The respiration is now perfectly easy and natural, and her only complaint is of some slight uneasiness on deglutition, referred to the cut surfaces. Bowels open; pulse calm, 88; skin moist.

On the 16th the air had ceased to pass through the opening, and everything promised well. On the 17th there was a little redness and swelling around the wound, and on the 20th a small quantity of pus

was discharged from its lower part. From this time everything went on favourably, and she left the hospital on the 23rd, as well, in every respect, as she had been before the accident.

Mr. L. had ordered to be made, before operating, two different pairs of forceps fitted for seizing the bone in whatever direction it happens to be impacted in the bronchus, whether it lay with its edges pointing antero-posteriorly or laterally.



Of the figures in the engraving, *No.* 1 represents the form of the pair of forceps first used; *No.* 2, those by means of which the bone was extracted. The figures are here shown in miniature. The length of a straight line drawn along the centre of either forceps, from end to end, in the original, is seven inches. *No.* 3 represents the piece of bone of its natural size.

EXTRAORDINARY BIRTH.

To the Editor of THE LANCET.

SIR,—The following singular case of labour, accompanied by monstrosity, is worthy to be recorded, as an instance of one of those freaks of nature, which occasionally present themselves to the practical obstetrician.

On Monday evening last I attended a female in the neighbourhood of Shoreditch, who was delivered of three children, one of which, a male, was malformed in a most extraordinary manner, though the others, a male and a female, were quite perfect. One of these latter is doing well; the other lived for about an hour. The birth of the first child, which was of the usual size, was quite natural, but on examining the abdomen, its prominence appeared to be just as great as before delivery. After waiting half an hour, two or three pains ruptured the second membrane, and immediately there issued forth about two gallons of the liquor amnii, and a second child passed into the world; still the abdomen was very large, and the pains continued very strong, and on examination, the feet of another child could be felt, but twice the size of those of the former children. After nearly two hours' strong expulsive pains, a large child, of an extraordinary form, was expelled, but with considerable difficulty. Before the chord was tied, the pulsation of the heart was distinctly felt, and the circulation appeared, as is usual with children immediately after birth, accompanied by sudden twitchings of the legs. Upon examination, after tying the funis, the legs were found to be straight, and without any knee joint, the flesh hard and puckered, and the feet turned inwards, with only three toes on each foot. The abdomen was natural, with the parts of generation fully developed; the chest was much broader than usual, with a little projection (about half an inch in length on the left side) having two fingers on it. There was a little open-

ing, with a slight pouch, about the scrobiculus cordis and above it was a large fleshy substance, the contents of which the parents refused to have examined. The *arms*, the *head*, the *face*, and the *neck*, were entirely deficient.

It is the intention of the parents to keep it for some time, for the purpose of allowing the curious an opportunity of inspecting it, and then I hope to present it to the Museum of the London University, as a mark of my admiration of that noble institution, which, if encouraged as it ought to be, will remove the stigma on the medical schools of London, that they cannot confer the honours of science on their pupils. I am, Sir, your obedient servant,

ROBERT JEFFS.

81, Shoreditch, June 10th, 1834.

AMPUTATION OF AN ENORMOUS TUMOUR OF THE INTEGUMENTS OF THE GROIN, IN A FEMALE, AT THE BRISTOL HOSPITAL.

To the Editor of THE LANCET.

SIR,—The drawing sent herewith, represents Elizabeth Harris, a widow, aged fifty-five, from South Wales. The pyriform tumour exhibited in the sketch, hung from somewhat under Poupart's ligament, to about three inches below the knees.

It weighed six pounds, and the wound in the integuments, lengthwise, measured ten inches. She ascribed the commencement of the tumour to a violent blow received in 1820, since which time it had been gradually increasing in size. She suffered no pain, but was exceedingly inconvenienced by it. I removed it on the 11th of February last. It was not necessary during the operation to tie a single artery, but the venous hemorrhage followed every stroke of the scalpel in such profusion, that in spite of the very able assistance I received from immediate digital pressure upon the mouths of the severed vessels, I had very serious apprehensions, more than once, that the patient would have sunk. I performed the amputation as rapidly as possible, when, having secured three very large veins, all bleeding was at an end.

The woman had no unpleasant symptom, the ligatures soon fell off, and the edges of the wound closed kindly, so that at the expiration of a month the open wound was reduced to a couple of inches. The patient, however, not finding her quarters very disagreeable, remained in the house two months in all, when she went home quite well, and in excellent spirits.

The tumour contained within the cellular tissue a large, hard, horny body, wearing, in my judgment, quite a malignant character, but as its removal was complete, and I have heard nothing since of my patient, I presume that "all is well." The drawing was made by Mr. Jones Smith, to whose pencil we are not unfrequently very much indebted.

Yours very truly,

RICHARD SMITH,
Senior Surgeon, Bristol Infirmary.

Bristol, June 3rd, 1834.

ADMINISTRATION OF IODINE IN SECONDARY SYPHILIS.

To the Editor of THE LANCET.

SIR,—The subjoined remarks on the administration of Iodine and its compounds in secondary syphilis I enclose for insertion in the LANCET, if possessed of sufficient interest.

T. C., a vender of earthenware, aged 25, placed himself under my care. He was suffering from scarlatina anginosa, and in addition to the symptoms of that disease he complained of violent pain in the entire osseous system, discontinuing at intervals, and principally attacking the inferior extremities. He had likewise a copious discharge of blood from the nose, probably a pint a day, of a dark purple colour. The only account to be obtained from him was that he had been subject occasionally to similar attacks. He was treated in the usual manner for scarlatina, and that disease disappeared. But the discharge from the nose rather increased. Suspecting some fact was hidden from me, I inquired minutely, and after a vast deal of difficulty arrived at the truth, which was as follows. He had had connexion with a woman six years previous to applying to me, from which a general lues venerea followed, whereupon he placed himself under the care of a surgeon, who, for a time, by palliative measures, kept the disease under. At intervals, however, it broke out again with severity, when he was treated successively by several surgeons, from all of whom he derived temporary alleviation. Eight months before applying to me the disease again made its appearance. He then had recourse to a medical man, who salivated him. Whilst in this state he caught cold, and became much worse. Various measures of treatment were pursued for his recovery, and at the time he came under my care he was in the deplorable condition I have already described.

Upon ascertaining these facts I immediately gave mercury, with a view to affecting the gums, and after some time the ptyalism became very profuse, but I did not succeed in relieving any of the existing symptoms of disease. The mercury was accordingly discontinued. Gargles of the chloride of soda, with liq. calcis, relieved the ptyalism, as well as the bleeding from the nose. I then gave him pills of the extract of henbane and hemlock, but they completely failed in relieving the pain in the legs. Strong stimulating liniments, with opium, were then rubbed into the legs, which were likewise fomented with warm water continually, but all to no purpose.

The mouth, however, got well, and with it the sanguineous discharge from the nose ceased. I next exhibited Dover's antimonial powder, in small doses, three times a day for a month, as an alterative and diaphoretic. From this the man found partial relief, but the pain again came on as bad as before in the knee-joints and legs. I then rubbed in the strong mercurial liniment, and at the same time administered the oxymuriate of mercury, in conjunction with the extract of hemlock, in small doses. His mouth became tender again, but no relief ensued. I, therefore, discontinued these remedies, and gave him small doses of the oxymuriate of mercury, and tinct. of opium, by which I kept up a slight action on the gums for a few days; but the medicine gave him such uneasiness that I discontinued it. I then determined to try the tinct. of iodine, in doses of eight drops, three times a day. After taking this medicine for a fortnight, the quantity having been increased to twelve drops, he found evident benefit, but the remission of pain, although sometimes considerable, yet at intervals returned with its former severity. I then determined to try the effect of the following ointment:—

℞ *Hydriodatis Potassæ* ʒi;
Adipis Præp. ʒij.

A piece, the size of a musket-ball, to be rubbed into the legs every night and morning. The nodes were principally situated on the anterior surface of the tibia. Under this treatment very material improvement took place. The nodes were considerably diminished, and the poor fellow, after four months suffering, began to know the comfort of freedom from pain. This treatment I pursued for a month, but although under its influence the patient's sufferings were materially lessened, yet a perfect cure was not effected. He could now walk about the house (before, he had not been able to quit his bed), and even extend his perambulations a short distance in the neighbouring street, but the slightest change in the weather was followed by an exacerbation. At this time I determined to discontinue the tinct. of iodine, and substitute for it the *Hydriod. Potassæ*. I dissolved gr. xij in aqua ʒj, of which I directed gutt. xij to be taken ter die. To continue the ointment of the same strength as before. He had not been taking this latter remedy a week, when he stated to me that he was deriving benefit from it. At the expiration of a month the poor fellow was enabled to

walk a considerable distance from his own residence, and the pain was nearly gone.

Two months have now elapsed, and he has resumed his customary employment, his health being completely restored. The nodes have disappeared; his appetite is good, and only at occasional intervals does he feel any pain. I still order him to rub in some of the ointment, and he takes the drops in reduced doses, occasionally. In fact, I may say that the disease is completely eradicated, though, as almost a matter of course, after any severe disease, there occurs at intervals an occasional paroxysm.

Enclosing my name and address in full for your personal satisfaction, I have the honour to be, Sir, your obedient servant,

G. J. P——y.

Hants, 19th May, 1834.

JAUNDICE, WITH CEREBRAL AFFECTION.

To the Editor of THE LANCET.

SIR,—Since the publication of the cases of jaundice, accompanied with cerebral affection, by Drs. Griffin, Alder, and Arrowsmith, I have met with a case in an old woman, in whom the cerebral symptoms were very well marked. She did well under the use of purgatives, and the usual remedies for jaundice. In such severe cases, as have been mentioned by the above gentlemen, it would be useful to inquire what is the best mode of treatment. Your obedient servant,

OBSERVATOR.

Ely, June 7th, 1834.

USE OF THE

EXTRACT OF BELLADONNA

IN CASES OF

STRANGULATED HERNIA.

THE means employed to obtain the reduction of a hernial tumour before having recourse to an operation are extremely numerous and varied; some surgeons depend entirely on bleeding and cold topical applications; others endeavour to lower the strength of the patient, and diminish muscular action by powerful and frequently repeated doses of tartar emetic, and the same effect has been obtained by the administration of tobacco through the rectum; but the use of this latter remedy is always attended with inconvenience and danger, in consequence of which it has been altogether abandoned by the continental surgeons. The effects of belladonna on certain muscular structures have been long known and taken advantage of in surgery and midwifery, and it was no doubt from analogy that Dr. FRANKEL, according to a paper in the *Journal des Chirurgerie und Augen-Heilkunde*, vol. xx, of which we make the following brief analysis, was induced to employ it as a powerful auxiliary to other means for the reduction of strangulated hernia. Since 1829 he has treated six cases of this kind successfully, by repeatedly rubbing the tumour with a pomade containing belladonna.

The first case was that of a female peasant, aged 42 years, who had been thrown down and injured by the pole of a cart. She was brought to the hospital in a state of extreme feebleness, with nausea and vomiting. On examination, a strangulated hernia was discovered on the right side; she was immediately bled, leeches were applied to the part, and cold lotions placed over the tumour. In spite of these remedies, the abdominal pain increased, the constipation was obstinate, and the vomiting became stercoraceous; an operation was proposed, but rejected by the patient. Dr. Frankel now administered at intervals a few drops of laurel water, and rubbed the tumour, every hour, with an ointment containing a large quantity of the extract of belladonna. This application was soon attended with happy results. The accidents were alleviated, the hernial tumour became soft and small, the vomiting ceased, and the hernia was rapidly reduced.

In another case the symptoms of strangulation had lasted for eight days, and an operation was pronounced indispensable, when reduction was obtained by the belladonna. This was a female whose hernia descended only during pregnancy, in consequence of which she did not wear a bandage. The tumour reappeared after a violent and sudden effort, and soon became strangulated; the bowels were now obstinately confined, there was vomiting of fecal matter, and, in short, all the symptoms which usually accompany strangulated hernia manifested themselves. The surgeon in attendance proposed an operation as urgent, but, as in the former case, the patient was unwilling to submit, and the extract of belladonna in conse-

quence was employed after every other means had been in vain tried during eight days. The remedy was here attended with success, and the tumour soon reduced.

The other cases reported by the author are of a similar nature, and were terminated in a favourable manner. It is worthy of remark, that they were all examples of femoral hernia in females, a species which is much more subject to strangulation than the scrotal hernia of man.

CURE OF DIABETES MELLITUS

WITH CREOSOTE.

The following is a short account from *Hufeland's Journal*, for Feb. last, of an eighth case of the above disease, treated by Professor Berndt, of Driefswaldt, after having treated the preceding seven with opium, emetics, arsenic, bleeding, &c., all unsuccessfully. The seven all died. The eighth patient was a man fifty years of age, who daily passed seven and a half pints of urine, which, when analyzed, was found to contain a good deal of sugar. There were considerable thirst and appetite, and little sleep, but no hectic fever had appeared. An emetic was at first administered, and the patient then put on Rollo's diet, but without benefit. Finally, he was directed to take daily eight drops of creosote in sixteen pills of gum-arabic. The thirst and appetite were soon reduced, the excretion of urine was brought down to three pints, and then to two. The dose of the remedy was now increased, and the animal diet suspended after three weeks employment. The urine now contained much less sugar, and began to offer some traces of urea. From this period the quantity of urine rapidly diminished, the sugar gradually disappeared, and the excretion finally assumed its natural qualities, and was discharged in regular quantity: the patient in a word was perfectly cured.

NEW ETHER.

M. Pelouze lately discovered a new ether, which he calls "hydrocyanic," while examining the effects produced by heat on a mixture of the sulpho-vinate of barytes with cyanuret of potassium. This ether is liquid, colourless, possesses a very pungent allaceous odour, and acts energetically on the animal economy. It is inflammable, it boils at 82° under atmospheric pressure, its density is 0,787 at a temperature of 15°, it is but little soluble in water, but is perfectly so in alcohol or sulphuric ether. It does not precipitate the nitrate of silver, and in this respect resembles hydrochloric ether, which does not decompose the salt until it has been destroyed by the action of heat. M. Pelouze regards the hydrocyanic ether as composed of equal volumes of olifiant gas, and of the vapour of prussic acid, condensed one-half. The idea of searching for this ether was suggested to M. Pelouze by an observation of M. Zeize, who discovered a peculiar substance, possessing acid properties, and formed by the action of barium on the sulpho-vinate of barytes; its composition was such as to lead to the conclusion that it was a kind of alcohol in which the oxygen was replaced by sulphur.—*Gazette des Hôpitaux.*

MEMORIAL

ADDRESSED TO THE CHAIRMAN OF THE PARLIAMENTARY COMMITTEE ON MEDICAL EDUCATION, BY THE LECTURERS IN THE MEDICAL SCHOOL OF BRISTOL.

To Henry Warburton, Esq., M.P.,
Chairman of the Committee of House of Commons, London.

Sir,—Having reason to believe that the Committee over which you preside are anxious to collect all the information that can be obtained on the present state of medical education, and to give attention to statements of grievances and disadvantages experienced in any department of the profession,—we, the undersigned lecturers of the Bristol Medical School, take the liberty of addressing your Committee on a subject which we consider of vital importance to the success of our institution, and consequently to the interests of medical students in this city.

We do not think it necessary to trouble you with any remarks tending to demonstrate the possibility of completing a medical education beyond the walls of the metropolis, nor shall we urge the advantages which are peculiarly afforded by Bristol for the prosecution of medical study. For information upon the latter point, we beg to refer to the prospectus of the "Bristol Medical School."

The object that we have in view in the present memorial, is to solicit respectfully,

but earnestly, that you will take into consideration that regulation of the Council of the Royal College of Surgeons, which prescribes an attendance of six months at one of the hospitals in London, as a necessary condition for obtaining the diploma of the College.

The intention of this regulation was undoubtedly a good one; it was designed to enforce the acquisition of a certain quantum of practical information, which, according to the ideas of the framers of this regulation, would be accomplished with greater certainty and more collateral benefit in London than elsewhere. Whether this idea was a correct one at the time the regulation was enacted, it is not our business to inquire, but we conceive that the mere fact of the existence of such hospitals as are now common in the provinces, and a knowledge of the mode in which their professional departments are conducted, must be amply sufficient to show, that however superior were the advantages once afforded by metropolitan institutions, that superiority no longer exists. Nay, we might go a step further, and say, that a student will spend a given time at a hospital in the country more profitably than at one in London, for the simple reason that his examinations of cases in the latter instance, must to a certain extent be contracted and disturbed by the throng of persons who are no less desirous than himself of extracting the same amount of information from such cases; but this inconvenience rarely or never occurs in provincial institutions.

But were the regulation in question *superfluous* only, we should feel some hesitation in troubling your Committee with our sentiments upon the subject. But we regret to say, that its operation is actually injurious by interfering with those branches of provincial education which have no immediate connexion with hospital attendance. When a student knows, that however diligently he may toil in the prosecution of his studies under provincial teachers, his course can never be completed without a certain residence in London, he is induced to underrate those opportunities which are in his present possession, and to delay the pursuit of various branches of knowledge, until he shall have repaired to a situation where he imagines that he shall imbibe instruction of a more profitable character than can be obtained under his present circumstances. In the mean time he neglects the acquisition of those fundamental principles of medical science, which are absolutely essential to the utility of a residence in London, and falls into habits of idleness and listlessness, or, at best, of superficial observation, which would render him incapable of making the acquisition that he needs, during the prescribed residence, even if the time were sufficient for the purpose, but which is very far from being the case. In order, however, to obtain a certificate of his capability of practising, he adopts a pernicious method, but too common among students in London, that of resorting to a private tutor, who, although he may, by dint of what is technically termed *grinding* or *cramming*, enable his pupil to answer a number of interrogatories before a Board of Examiners, cannot be expected to qualify him for the responsible and difficult duties of a medical practitioner.

When to the foregoing considerations we add the well-known fact, that vast numbers of promising young men have had their characters, their usefulness, and their peace of mind, irreparably ruined by even a brief sojourn in the capital, where practices of immorality and licentiousness may be pursued with such facility and with so little immediate disgrace; when we urge that a heavy expenditure is incurred by students in addition to that which medical education must entail under any circumstances; and, finally, when we submit that the regulation implies an invidious distinction between the hospital teachers in the metropolis and those in the provinces, we entertain great hopes that your Committee will think it right to recommend to the legislature that the obnoxious regulation be annulled.

We have the honour to remain, Sir,
Your obedient servants,

Henry Riley, M.D.
I. A. Symonds, M.D.
Wm. Hetting, M.C.R.S., Surgeon to the Bristol Infirmary.
Henry Clark, M.C.R S., &c.
J. C. Swayne, M.R.C.S., &c.
G. D. Fripp, M.C.R.S., Surgeon to the Bristol General Hospital.
Wm. Herapath.
Samuel Rootsey, F.L.S.

THE LANCET.

London, Saturday, June 14, 1834.

In criticising the conduct of men holding public offices, it often happens that a journalist is called upon to impugn motives from a close inspection of the bearing and tendency of actions. There is no circumstance connected with the discharge

of an editor's duty more thoroughly disagreeable than that of imputing, to opponents, improper intentions. Frequently it is sufficient to advert to the mischief that may arise from the working out, into detail, of obnoxious principles. It is sufficient on most occasions simply to refute arguments, to show the fallacy of alleged facts, and to illustrate the solid foundation on which every institution relating to the public welfare should be constructed. When individuals are thrust into the arena of dispute, they are generally introduced under circumstances which are disadvantageous to friends as well as to opponents. The pages of a periodical ought not to be occupied with the disputes of individuals, when those disputes spring out of private and unofficial actions. Neither is it right, on common occasions, to unjustly connect the names of persons with unsound maxims, absurd hypotheses, or dishonest practices. The rule is generally and generously observed, of warring against systems and not against men.

But what course must that writer pursue who can behold no sign of the system which he deprecates, if it constitute not the life-breath of the individual by whom it is upheld,—a system which is wholly knavish,—a system which is founded and maintained by dishonest dealings,—a system which has been fed with the blood sacrificed by the afflicted poor of this metropolis,—a system which has made merit the subject of neglect, reproach, and mockery, and which has required from the medical practitioners of England, a confession that their professional talents are not equal to those of a despicable faction?

The system to which we refer, is, necessarily, that of medical government and education. To support that system no aid has been wanting which ingenuity could invent, which hypocrisy could suggest, or which fraud could devise. Coffers well filled by funds which have been wrung from the students of a laborious profession, have always been at the command of its founders and friends. Hence it has followed, in the natural course of things, that the opponents of that system have been the objects of unceasing attack and slanderous abuse. The puerility of the assault on the public opponents of the system does not detract from its baseness.

While the advocates of a new system of medical government have thus been assailed with the most bitter invectives, at the same time the advocates of the existing system of monopoly have carefully refrained from every attempt to show by argument, that the Colleges and Hospitals, as they are now controlled, constitute the most efficient frame-work for securing the great objects of medical education and government. In short, they deem it more prudent to assert, with official and venal daring, that a new system, such as has been recently proposed, would not be an improvement on the old one, if it could be carried into effect, and the achievement of that object they allege, with corrupt pertinacity, is one of the thousands of Utopian impossibilities.

What, then, was to be done with such an impertinent class of dogmatical asserters? Why, it has necessarily happened that the advocates of medical reform have been compelled, by the very circumstances of their position, to illustrate the defects of the present discordant mode of governing the profession, and disarranging the business of medical practice, by pointing, directly, to the mental professional deformities and incapacities of the favoured individuals, through whose contrivances, exertions, and avarice, the savage system of monopoly was invented, and has been upheld.

It has not, therefore, been simply a system of bad laws and vicious measures that has called for the reprehension of

every independent medical journalist, but also the depraved individuals who invented and fostered that system for their own private advantage, and these have, from time to time, been held up, by name, to public odium and contempt. There were no other means of fighting such antagonists. Contented with things as they were, these parties invariably kept aloof from the field of *discussion*, and affected to deprecate every inquiry into the causes which led to their official elevation.

The task of exposing the infamy of our code of medical laws, by a reference to the dishonest practices of persons who held distinguished offices under it, was, it must be admitted, one of an exceedingly disagreeable character. But the obnoxious system had, if we may be permitted to use the term, become individualized by the pertinacity with which the interests of particular families and schools had been protected. From first to last the proceedings of the colleges and recognised hospitals, exhibited one unbroken course of favouritism and nepotism. An analysis, therefore, of the frauds which were practised against the profession and the community, brought into view the offensive elements of the fountain of intrigue. If persons were made to suffer, crime was the cause. It was not the fault, but the misfortune, of a journalist that he was compelled to touch with the severest criticism the characters of men who, from their station in the profession, ought to have maintained an unsullied reputation. Considering the manner in which they had received their medical education, an incompetency for fulfilling the duties of their respective offices might to a certain extent have been excused, if it could not be justified. But no apology could be offered for *their dishonesty*. Their tyrannous exercise and abuse of power, their neglect of merit, their perseverance in insulting the profession, could not be concealed or palliated. Availing themselves of the privilege of executing the provisions of infamous laws, they seized with avidity on the worst portions of those laws, to accomplish the worst of purposes, rendering, in short, every authority under their control instrumental in advancing their own private ends and objects, neglecting at the same time the paramount interests of science, the health of the community, and the welfare of the profession.

When it was resolved by the Council of the College of Surgeons that certificates of the performance of dissections in the "winter" session should alone be recognised by the court of that institution, it was alleged by the Committee, and their toad-eating hirelings, that "the regulation was instituted with no other view "than that of benefiting medical science." When the same College resolved, that no certificates of lectures on anatomy should be received by the Court, unless the school in which the lectures were delivered was "recognised" by the "medical establishment" of one of the "recognised" hospitals, that most odious and infamous by-law was represented as having been designed "with a view to accomplish the best objects of medical education." When the rulers of the same institution resolved that members of the College practising midwifery and pharmacy should be for ever excluded from seats in the Council, that vile edict was also commended as "tending to support the dignity of the College, and the respectability of the profession." When the notorious chief of the College in Pall Mall East alleged, as a reason for the punctilious preference shown to graduates of the universities of Oxford and Cambridge, in conducting the admission to the Fellowship, "that the discipline of "those universities was a guarantee of "the *moral fitness* of the candidates," it was affirmed that the governing prin-

ciple of this selection was to be found in "a desire to uphold the respectability of the profession," and that, in order to secure that end, the "certainty of finding untainted moral purity in the graduate," more than counterbalanced the trifling drawback of his possessing no medical attainments. So happened it in the College of Surgeons. All their laws were framed under the plea of promoting the cultivation of "sound chirurgical knowledge," and of "increasing the respectability of the profession." These regulations were, of course, framed in a spirit of honourable and patriotic disinterestedness. The fellows of the College of Physicians, in giving a preference to the graduates of Oxford and Cambridge, had, of course, no desire to keep within narrow bounds the number of their associates, and to render that number as aristocratic as possible, by demanding from the candidates a proof that they had incurred the *maximum* of university expenditure. The Council of the College of Surgeons were equally disinterested, and free from aristocratic bias, when it was determined that certificates from the country hospitals should be proscribed, and that testimonials of attendance on lectures on anatomy and surgery should not be received by the Court, unless signed in the hospitals and schools of which the "regulation" mongers were themselves the managers. In short, of course, the whole of this active system of "regulating" the admission of candidates, and prescribing the various courses of instruction for students, was carried on out of a "pure love of science," and, possibly, from a still stronger desire to "uphold the respectability of the profession." If the "regulations" of the College and favoured schools pressed with severity on the less opulent classes of parents and guardians, that was a misfortune, a species of individual privation and suffering, which, however painful, ought to be endured for the public good. It was a sacrifice of private interests to public advantage. The enlightened spirit of the age demanded the boon, and those ardent lovers of science required that a compliance with so excellent a requisition should be yielded without complaint.

The effrontery displayed on those occasions by the tyrannical hypocrites, surpasses belief. How they could imagine that the real object of their proceedings could be so much disguised as to cheat the profession out of a just conception of their tendency, is one of the most remarkable of the events which have been connected with collegiate misgovernment. Fortunately for society, as the laws were successively issued, they were instantly grasped and torn to fragments. The operation of those laws having invariably been shown to have a tendency to promote the pecuniary interests of their designers and framers, the law-makers within a comparatively brief period became the objects of hatred and denouncement throughout all ranks of the profession. A reference to their private worth, an acknowledgment of their social excellences and virtues, an advertence to the high offices they held, the allegation that their personal resources had placed them above the seducing temptations which honest poverty cannot often withstand, were insufficient to shield them from incurring public and professional disgrace. In short, their measures have been scrutinized, their proceedings have been investigated, and their objects have become thoroughly understood. When they professed to be actuated by a love of science, the declaration was discovered to have no other basis, no other pretext for its utterance, than the most grovelling feelings of avarice, and independent members of the profession, established in every corner of the empire, were forced to the conclusion that the governing medical bodies were

influenced in all their acts, by only two motives,—the creation of a pocket-aristocracy in the profession, and the benefiting of themselves at the expense of the profession and the community.

That the profession formed a correct judgment on this subject will be at once seen on a perusal of the following passage, which is extracted, *verbatim*, from a journal which was at first started, and has since been kept in existence, by the subscriptions of the monopolists,—by the men who have laboured so zealously to promote the cultivation of "sound chirurgical knowledge," and to "uphold the dignity of the profession;"—in a word, by the subscriptions of the HALFORDS, the BLIZARDS, the ABERNETHYS, the BRODIES, and the VINCENTS, of the day. We have not space at this time to comment on the atrocious principle which the argument of the hireling of the monopolists involves, but we quote the passage from No. 339 of Longman's Green Journal, p. 325, in order that the confession which has been thus wrung from the corruptionists may be made known to the profession in every part of the world, and in order, also, that Mr. WARBURTON, and the members of the Parliamentary Medical Committee, may become acquainted with the designs and principles of the governing medical bodies of this country. It will be perceived that the remarks of the hireling scribe are intended to refer to one of the statements contained in the "Memorial" of the Bristol surgeons which was lately published in THE LANCET. We think it right to print some of the words in italics and capitals. They merit that distinction:—

"A residence in London, though but for six months, is objectionable in the eyes of the Bristol surgeons, because it occasions a very considerable increase in the *PECUNIARY EXPENDITURE OF THE STUDENT*. This is an argument of *a very questionable kind*. We have *always thought*, that in order to secure the *RESPECTABILITY* of the profession, *the facilities of entering it ought not to be too much increased*; practitioners are already more numerous than the demand for them,—what would it be, if the door were opened still wider? To our poor judgment, this is the most *unlucky argument* of all those adduced by our friends in Bristol."

THE following article, written on the subject of a rumour that the odious resurrectionists have been resuming their loathsome exhumations at Hull, is extracted from the *Observer* newspaper, published in that town. It appears in the provincial journal as a leading article, and we must say that the temper and judgment displayed in it are highly creditable to the discernment and independence of the writer:

"Reports have been for some time in circulation that bodies have been exhumed in the grave-yards of this town and neighbourhood, in order to furnish 'subjects' for anatomical investigation. In consequence, we suppose, of complaints founded upon these reports, Dr. Somerville, Inspector of Anatomical Schools under Mr. Warburton's Act, paid, last week, an official visit to Hull. Whether the inquiries of the Inspector educed facts confirmatory of the current rumours we are unable to say—but this we know, that, well-founded or otherwise, the agitation of the popular mind in relation to the matter has been considerable.

"Any person capable of reflection must admit the necessity of anatomical knowledge as a branch of medical education. Unless the dissection of the dead be permitted, the living will be obliged to suffer torture under the hands of ignorance and inexperience. A carpenter would amputate a limb more efficiently than a surgeon unpractised in the use of the knife. To be able to pronounce upon the state of the internal organs with accuracy demands acquaintance with their structure and distribution, derived from actual examination and comparison between their healthy and their morbid condition. No man is fitted to undertake the duty of attending the sick who has not made himself familiar, by dissection, with the machinery of the human frame.

"For the benefit of the poor, it is especially desirable that the number of properly qualified practitioners should be multiplied. The wealthy can afford to re-

move to the head-quarters of science, and to obtain the rarer appliances of professional skill, but for suffering indigence there is no help unless it can be found at home, and at an easy price. It is, therefore, a very spurious humanity that would forbid the acquisition of a branch of surgical knowledge of such primary utility as that gained by dissection. If there were no other alternative, it were much better that violence should be done to the feeling which hallows the remains of relatives and friends, than that the living should drag on a miserable existence or expire on beds of anguish, owing to the prejudice which shrinks from tolerating an examination of the cold, insensate clay.

"Yet this prejudice is not undeserving of respect, nor should it be causelessly or wantonly assailed. There are few, even among philosophers and men of science, who, however regardless of the appropriation of their own bodies, would choose to transfer a child, a wife, or a parent, to the table of the anatomist. We need not wonder, then, at the repugnance of the poor—among whom the household affections are peculiarly strong—to the calling of the resurrectionist. Since a knowledge of the healing art cannot be acquired without dissection, it is right that facilities should be granted for its attainment; but these facilities ought to be guarded by regulations framed so as to attain the desired object without violating the decencies of sepulture, or outraging the sentiments of natural affection.

"The legislature has made provision for the wants of anatomical schools, and to the range accorded by law the heads of these institutions are called upon to restrict their operations. It ought to be remembered that from the vile trade of the resurrectionist sprang those horrible atrocities, new to the records of crime, which have been enrolled in our language under the name of their first detected perpetrator. The plunderers of the tomb rarely commence their revolting occupation until they have acquired the habits of the ruffian. With every midnight expedition, they become more desperately hardened, until they at last begin to regard a fellow-creature in no other light than as a marketable article.—Medical men who hold any communication with these wretches stain the character of a profession second to none in worth and dignity. We will not permit ourselves to imagine that their presence is welcome at any medical institution in this county; but should an impression of the kind exist among the community, that alone is sufficient to make it the duty of the proper authorities to place the suspected school, wherever it may be, under such vigilant superintendence as, by rendering it impossible to violate the law, will at once remove the apprehensions of the public, and clear the discipline of science from a degrading doubt."

HOPITAL DES VENERIENS, PARIS.

ON THE USE OF THE PROTO-IODURET OF MERCURY IN THE VENEREAL AFFECTIONS OF CHILDREN.

Amongst the important results derived from the researches to which M. Ricord has for several years devoted his attention at the venereal hospital, there is one deserving particular notice—viz. that hitherto he has never observed primary symptoms of a syphilitic affection in children, except in those who had either suffered from the violence of an infected individual, or when the mother, labouring herself under primary symptoms, had communicated the disease by immediate contact; with these two exceptions, the venereal disease in children is altogether secondary, or, at least, presents the characters of symptoms which M. Ricord is in the habit of describing under this name. The children received into the venereal hospital have never, except in the cases alluded to, exhibited ulcerations capable of being communicated by inoculation, or having the least analogy with the true venereal sore.

We do not now propose to enter into the question as to how the disease may be transmitted from parent to child, but, taking the facts as they present themselves in practice, to seek the most proper mode of combating the different forms in which the affection may appear. In this respect we may affirm, without hesitation, that if any medicine deserves the name of specific, this title may be justly given to the proto-ioduret of mercury, administered internally in the form of pills, or as indurated honey. In every case where this preparation was employed, the cure was easily obtained, and, comparatively speaking, much more rapidly than when the patients were adult; and it is remarkable, that the treatment was never followed by those accidents sometimes attending the use of mercurial preparations by full-grown individuals. The most common affection observed in infants, especially those at the breast, is the mucous pustule, and next to it the pustular syphilitic eruption, and it is precisely against these two forms of disease that the action of the proto-ioduret of mercury

is most rapid and marked; ten pills have often been sufficient to remove large patches of mucous papulæ covering the vulva, anus, and upper parts of the thighs. When the disease is in some respects complicated, and there exists at the same time ulcerations of the throat, or discharges, &c., the proto-iodurct should be aided by some local remedy, as a gargle, injection, &c., or should be mixed with honey, and applied directly to the ulceration; and the united action of these applications will soon produce results which we would have in vain sought to obtain by the exclusive use of any one singly. In spite of the most careful experiments, M. Ricord has not as yet been able to determine in a positive manner, that the use of this remedy by the mother while suckling, may produce the cure of the child, through the medium of the milk; on the contrary, the disease was frequently developed in the latter, although the mother had been taking mercurial pills for a long time, and appeared on the way to cure. However, M. Ricord is far from rejecting the observations hitherto published in favour of this intermediate medication, but simply thinks that new experiments are necessary to obtain certain proofs of its efficacy.

Finally, M. Ricord does not confine the use of the proto-ioduret of mercury to cutaneous syphilitic affections alone; he has frequently observed ulcerations of the throat, which resisted all local treatment, improve under its influence, as also the uterine, or vulvo-uterine, discharges of young girls directly infected, in whom the deep-seated parts seemed to furnish an inexhaustible secretion. However, in the latter case, the action of the pills is much less remarkable, either because they are positively inefficacious, or because certain secretions, which we cannot always distinguish from blennorrhœa, are brought on and kept up by evil practices, a circumstance that must be attended to, or we shall be likely to form an erroneous judgment on the therapeutic value of the means employed. These considerations have induced M. Ricord to employ the proto-ioduret of mercury in the greater number of cases, because extensive experience has established this fact, that the pills, made after the formula which he employs, never produce any accident, while their use is always accompanied by the greatest advantage.

Infants submitted to this mode of treatment never suffer from the disorders which sometimes attack adults during the use of mercury, and compel the physician to suspend it; however, M. Ricord thinks that we should be always on our guard, and frequently examine the state of the little patient's mouth, in order that we may be prepared to arrest at its origin a salivation which would soon become dangerous if neglected.—*French Lancet, J. Rattier—Clinique of M. Ricord.*

(*To be continued.*)

CORRESPONDENTS.

We have received thirteen additional letters on the subject of the distribution of the medals in the class of Chemistry in the *University of London*, but we feel called upon to desist from publishing any further correspondence on the subject, unless Professor Turner thinks that statements have been made to his disadvantage which we ought to allow him to explain or refute. The prize-system, as at present conducted, is fundamentally defective. It can prove of no advantage to the medallists, amongst the discerning portion of the community, and it is a source of great annoyance to those students who imagine that the prizes are not awarded impartially.

A. B., London Hospital.—No account of the breaking of a man's arm by one of the surgeons has been sent to us.

Mr. Bevan's case shall appear.

T. P.—Yes, if the lecturer be one of the teachers "recognised" by the Court.

Notice.—It is particularly requested that ALL letters of business forwarded to the Office of The Lancet,—whether they relate to the contents of the journal, or refer to transactions connected with the Commission Department,—be INVARIABLY addressed to THE EDITOR—Mr. WAKLEY. If this rule be not observed, it is impossible to guard against the impositions of anonymous scribblers who appear to have no other employment or pleasure than that of subjecting the conductors of journals to a heavy extortion in the shape of post-tax. If all letters of business transmitted to the office be addressed to the Editor, and NO letters, unless so addressed, be received except the postage be paid, impositions will be effectually prevented.

Literary Notice.—In July will be published a new edition of Mr. Wardrop's "Morbid Anatomy of the Human Eye," in 2 vols., royal 8vo. The price (says the publisher, Mr. Churchill) will be considerably reduced from that of the former edition, but the same regard will be paid to the fidelity and beauty of the colouring of the plates, the whole being executed under the superintendence of the author.